FARMERS DIGEST

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The Farmer's Digest

EDITORIAL STAFF:

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Business Manager—A. E. Heick

Associate Editors—
John A. Andrew, Jr., James Bush-Brown, Ruth Patrick

ADVISORY EDITORIAL STAFF:

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Chairman, Department of Soils
University of Missouri

Hugh H. Bennett
Chief, U. S. Soil Conservation Service

D. B. Johnstone-Wallace
Assistant Professor, Department of Agronomy
Cornell University

H. J. Reed
Dean of the College of Agriculture
Director of the Experiment Station
Purdue University

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The Farmer's Digest

Volume 4 June, 1940 Number 2

Corn Improvement Marches On

Condensed from The Shorthorn World

J. Howard Biggar

THERE is more than passing interest in the fact that side by side with the tremendous advancement made in livestock improvement, there has been just as striking an advancement made in the improvement of corn—the feed crop which is basic in the production of meat—the finished product of the livestock industry.

Corn is America's leading cereal. In acreage, in diversity of uses, in volume of production and in annual value, it exceeds that of any other cultivated crop. And in this connection it might also be stated that no crop is more plastic in the hands of the plant breeders than corn. We were rather forcibly reminded of that fact one day a few years ago, when we visited the plots of the Illinois Experiment Station at Champaign. Here in one plot we saw corn plants whose ears were borne about 10 feet from the ground on giant stalks. In a plot close by, we saw corn plants about three feet in height with ears borne almost at the surface of the ground.

A striking contrast—and yet more surprising than the variations themselves, was the fact that years before the foundation seed for these two diverse strains was selected in the same field. In brief the story is that Dr. C. G. Hopkins, of the experiment station, had decided that he would test out the power of selection. He took a couple of sacks and went into a field of Leaming corn. He selected the highest ears he could find in this field and put them in one sack. In the other sack he put ears which grew lowest on the stalks of that field.

The next spring Dr. Hopkins planted seed from each selection in separate plots which he called the high-ear and the low-ear plot. Year after year seed was selected from the ears growing highest in the high-ear plot and from the lowest growing ears of the low-

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ear plot. In 20 or 25 years the changes which we have described above, have taken place. There is no practical value in corn with ears growing 10 feet from the ground, or in corn with ears growing at the surface of the ground, but Dr. Hopkin's experiment has shown what selection may accomplish, and that is worth while.

Selection of corn in the field, or mass selection as it is usually called has accomplished much in corn improvement. Over a long period of years painstaking growers have in the past determined on an ideal type of ear or strain of corn and then worked toward achieving that ideal. In many instances the local names of corn varieties are proof of the achievements of growers, including such varieties as Duncan White Dent, Biggs Two-Ear, Steen Yellow Dent, Wimple Yellow Dent, Pickett and others. Some selected for a smooth type or a rough type of ear. Some sought greater length of ear, or a more cylindrical ear, a more uniform height of ear on stalk or some other characteristics.

The history of the well-known variety Reid Yellow Dent affords a classic example of what can be accomplished through selection. The story is told that Robert Reid moved from Ohio to Illinois in 1846, taking with him a late variety of corn known as Gordon Hopkins. He planted this seed in Illinois rather late and the crop was rather immature. The next year he had a poor stand and so he replanted the missing hills with a local variety, known as Little Yellow Corn, of flinty type. From the crop that year which was doubtless considerably mixed, Robert Reid's son, James L. Reid, developed Reid Yellow Dent which probably has been the most popular and widely known variety in the Corn Belt.

Let us now consider some other methods of corn breeding which have been in use in this country. First, ear-to-row breeding;

A number of years ago the writer was carrying on corn experimental work on a 3,000-acre farm in southern Ohio. The method used was the ear-to-row method. In this method, portions of carefully selected ears of corn were used. Part of the seed from each ear was planted in a separate row known as an ear-row. The remaining portion of the ear was saved over for another year. All ear-rows were harvested in the fall, the yields were secured and the quality of the corn was recorded. Based on that year's performance, the parts of the ears which were saved over were either discarded or used the next spring in another plot. The idea was that such a constant selection would build up a high-yielding strain.

We recall husking out the various ear-rows one fall and finding that the highest yielding ear-row had shown a yield of 119 bushels per acre while the lowest-yielding ear-row yielded at the rate of 64 bushels per acre, or a range of 55 bushels per acre. Now that wide difference in yield would seem to lend much encouragement. However, the history of ear-to-row breeding all through the nation has not been very satisfactory. It did not pay dividends on the time and labor necessary in carrying it out. In fact, actual tests showed that just as much real progress could be made through mass selection in the field as by the tedious ear-to-row process.

Another method used in corn improvement was that of crossing of varieties to create a new variety. The idea behind this was the idea that the cross would be more vigorous than either parent. The writer recalls testing out variety crosses of many kinds. The crosses of dent and flint varieties seemed to be the most vigorous, and we recall the extreme vigor of crosses in which an Argentine, South American flint was crossed with our yellow dent varieties.

The crossing of varieties for the production of new strains was only partly successful. The history of this method has shown that only occasionally a cross is secured which is outstanding. In some varietal crosses, the resulting corn is inferior to either parent. In other cases, the cross is superior to one parent and inferior to other. This method is now largely out of date.

A few years ago, some progress was being made in corn improvement through community testing projects, carried out on farms. In these projects, local strains of corn were planted in the same plots and some strains were also brought in from the outside.

It was through such a community or county test, carried on over a three-year period in Woodford County, Illinois, that the merits of a variety known as Krug yellow dent, were discovered. More than 100 farmers of the county entered varieties in these tests. The Krug corn made the best record for the three-year period. It was found that this Krug corn was quite adaptable to other conditions and it has made good in other states besides Illinois. Since that time it has been used in the production of some of our present good corn hybrids.

Although the methods enumerated above and others tried out for the improvement of corn, were productive of some results, corn growers and breeders felt that their problems were not being solved. Even under the most careful practices, there were still, weak stalks, barren stalks, diseased stalks, smutted stalks, and stalks with other inferior char-

acters. Strains of corn were needed to better resist drought, extreme heat and cold soils—in short to cope with climatic conditions and other factors which limit both quality and yield.

Then came an era in corn improvement which will go down in history as one which has accomplished more for the corn growers of the United States than any other method. Hybrid corn has come into its own.

It was in the year 1905 that Dr. G. H. Shull began inbreeding corn at Cold Spring Harbor in New York. Following the development of inbred strains, he crossed the inbreds and produced hybrids. The reports of his work centered attention on this new method of improving corn. In the same year, Dr. E. M. East also began inbreeding corn at the University of Illinois. Later Dr. East went to the Connecticut Experiment Station and continued his work there.

The first hybrids produced were single crosses—that is were crosses of two inbreds. To. Dr. D. F. Jones, of the Connecticut Experiment Station, must go the credit for developing the first "double cross." In other words he first crossed two inbreds to secure a single cross and then crossed that single cross with another single cross, so that his double cross was made up of four inbreds. Two of Jones' four inbreds in his first cross were of a white variety—Burr White. The other two inbreds were of a yellow variety, Leaming. This first double cross was developed in the year 1917.

Rapid indeed has been the spread of the hybrid corn idea. Today, more than 50 per cent of the corn crop in leading corn states is hybrid corn. More than thirty experiment stations are carrying on work with hybrid corn, to say nothing of the plant breeders who are employed by commercial firms.

The rapid development of hybrid corn is helping to solve many of the corn problems of other years. Some of the more desirable traits possessed by hybrid corns are the following: more vigorous growth, fewer barren stalks, fewer nubbins, stronger root systems, more uniform maturity of crop, better quality of grain, fewer broken stalks, ability to resist lodging, greater ease in harvesting, better quality of silage, greater resistance to corn diseases, ability to grow in cold soils, resistance to drought, resistance to insect attacks, resistance to high temperatures, and many other advantages. Failure to combat many of the troubles cited above, has in the past, been a limiting factor in the yield and the quality of the nation's corn crop.

It goes without saying that just because a corn is a hybrid, is not proof that it is always desirable.

It is also evident that hybrid corn breeders recognize that much further improvement is necessary. A hybrid may be resistant to drought, for example, and yet not be resistant to low temperatures in the early fall or cold soils in the spring. Another hybrid may be resistant to chinch bug damage and yet suffer under extreme heat conditions.

The question of climatic conditions is an important one in the evaluation of hybrids. Just because a hybrid is making good in one section of a state is no reason why it may prove superior in another section. In short, plant breeders are today seeking to produce hybrids which will have the greatest possible number of desirable qualifications. Quite a difference has been observed in the climatic adaptation of hybrids. This fall we learned of one of the corn belt hybrids which shows a wide range in adaptation. It has made good in southwestern Iowa, northeastern Missouri, southwestern Kansas. It has proved to be a top-notcher for high yields and good quality in the Norfolk section of Virginia and in addition is one of the best early corns in the state of Arkansas.

Many growers do not risk their prospects on one hybrid but grow two or more hybrids. This not only gives them a chance to compare hybrids for their particular conditions, but also is pretty good insurance against conditions which may limit the yields of one or more of these hybrids.

No one would attempt even to prophesy as to what we may expect of hybrid corn ten years from now. But one thing is sure —there will be progress. The fact that so many plant breeders are at work on the problem and are putting in their best licks to secure the best possible hybrids for their sections, is of itself proof that the poorer hybrids will fall by the wayside and that superhybrids will take their places.

Fix U. S. Farm Prices?

Reprinted from The Rotarian

John Napier Dyer

Cornelius J. Claassen

YES—John Napier Dyer

IF you fix farm prices, say some who oppose the idea, then you will have to fix the prices of suspenders, rag dolls, and whisk brooms. This deduction is absurd. I offer it merely as a typical example of the many misconceptions of price-fixing operations and of the general lack of understanding of the national economy, but I will come back to it later in my discussion.

Farming is the biggest business in the United States. It engages almost half the population. It is bigger than any six big industries combined—and it is probably the one least understood by urban dwellers. Certainly no one asks that the city man know the difference between a silage cutter and a corn sheller, but many of us believe he would do well to learn so as never to forget that the economic life of the city is rooted in the farm and, more specifically, that:

1. Agricultural income definitely gauges consumer demand for industrial products and is the governing factor in the national economy;

2. Raw-material wealth is the foundation upon which national income is built;

3. Factory payrolls are measured by the gross agricultural income.

These, as I have said, are established facts. Very well, you may ask, how can I reconcile the fact that the United States has 12 million people out of work and one-third of its population "ill fed, ill housed, and ill clothed" with the fact that it has so much surplus corn that the Secretary of Agriculture must buy thousands of new steel corncribs in which to seal it, and so much surplus cotton that the warehouses of the South bulge with 11 million bales?

The answer is: American agriculture is plenteous; it is not prosperous. In 1933 the national agricultural income dropped to about 5⅓ billion dollars. Factories closed. Unemployment hit new highs. Today that income is 8½ billion. It should be 17 billion.

The historic headache of 1929 is traceable to agricultural ills. During the period from 1921 to 1929 agriculture was taking

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heavy annual losses, the total running into billions.

Losses on crops	$21,900,000,000
Losses in land values	27,400,000,000
Increase in debt	8,000,000,000
Total	$57,300,000,000

That meant an 8-billion-dollar loss in buying power each year (and was part of a 56-billion-dollar decline in national income). When buyers become scarce and there is no money back in the country to buy the goods and services of the companies whose stocks are bought and sold on the exchanges, something always happens—and it happened in October, 1929. The full effect of the tragedy was not felt for two or three years, but its blight is still upon the States today. Remember the 12 million unemployed. Remember the 20 million dollars the Government has spent trying to find the cause of the trouble, and with little success. If the nation is to end unemployment and provide an adequate level of income for all, then it must have an annual national income of no less than 119 billion dollars.

It is within the power of the Government to assure a prosperous agriculture, but the Government has tried every kind of method to create normal business except the one and only kind, which is to re-create the buying power of the mass of people engaged in producing raw materials.

Contrary to public opinion, no farm legislation ever enacted in the United States has produced the result of creating and maintaining a stable price level for agricultural products, and there never will be any until legislators understand that price fixing is as necessary for agriculture as it is for railroads and public utilities, for gold and silver, for labor as under the wages and hours bill, and for industry as under the system created by the tariff.

So long as speculative interests are permitted to control agricultural prices, and farm products (wheat, corn, and cotton) are kept on a fluctuating world price basis, just so long will the United States suffer.

If the nation is to have a national income of 119 billion dollars insuring approximate equalization and stabilization of its domestic economy, on which its whole domestic trade depends, then it must enact some sound and effective legislation—and then enforce it. Such legislation is as feasible and practical as it is absolutely necessary, since the United States consumes more than 90 percent of its agricultural production (except cotton). Of cotton, it will be able to use 75 percent at home when the tremendous wealth generated by its raw materials priced at figures comparable to the prices of the finished products of industry has been turned into buying power.

Surplus agricultural commodities result from underconsumption and positively not from overproduction. Underconsumption is the result of the low income of the producers of raw-material products.

When the Government, with the best intentions in the world, buys 20 million pounds of butter at distress prices(it does nothing to create buying power by the producers of the butter. If the 26 million people on relief and the other poor in the nation had the price of a few extra pounds of butter a year as the result of steady employment, there would be no surplus—instead there would be a shortage.

As a manner of fact, if *all* the people of the United States had enough money to buy all the meat and dairy products they would need for a liberal diet, we would require 71 percent more beef cattle, 187 percent more hogs, 73¾ percent more dairy cattle, etc. So says the Department of Agriculture. The farm surpluses would disappear overnight—if people had the money to buy them.

The one and only stable factor in economics is the production and consumption of agricultural raw materials. Speculative fluctuations in farm-product prices seriously disturb the income of the agricultural raw-material industry, destroy the stable volume of production and consumption, and unsettle the basic physical factor in the total economic equation. A stable price structure, based on the cost of production with a supply regulated automatically to fit demand, will solve the "farm problem" for all time and will give the nation a sound agricultural policy. The plan works in industry. It will work in agriculture.

Agriculture's great need is that it should be put on a business basis, on the same basis as any other and all other business. What manufacturer would dare to accept an order for a full year's factory production without knowing in advance what price he is to receive for his product and let the buyer fix the price at the time of delivery? Tell a stocking manufacturer to deliver his entire output at a certain time and that the "law of supply and demand" will fix the price and see what he says to you. Yet this is exactly what the people of the United States ask the farmer to do with the six bushels of wheat each person uses annually.

The cost of producing a bushel of wheat, when all the factors of cost are taken into consideration, is approximately $1.50. The cost of producing corn is 85 cents a bushel. Yet wheat has sold for as little as 32 cents a bushel; corn, the nation's greatest feed crop, for 15 cents a bushel—which is cheaper than sawdust. The first part of the 1939 corn crop was

priced at 18 cents a bushel. Cotton was permitted to sell at 5 cents a pound and today it sells for 8½ cents*—one-third its true worth.

It is silly to talk of venturesome capital as a necessary factor in economic recovery when we ignore completely the most important thing that has to do with capital venture: a return upon capital investment created out of national income. Farm prices always have and always will regulate industrial production and prices, and directly regulate the volume of business on our security exchanges.

Every investigation has shown that over a long period of years it is the gross agricultural income which is the measure of industrial payrolls. If people are to have jobs at which to earn money, our factories must operate at capacity and there must be a buying power to consume the goods produced by these factories. The buying power comes from the profitable employment of the 44 percent of the people engaged in agricultural pursuits. There can be no profitable employment of people in agriculture when the products of the farmers do not sell for enough money to pay the farmer and his employed labor a decent living wage, and, under the existing price structure of agriculture, there can be no profit to our greatest business—farming.

Now, how is it possible to create that profit and so create that buying power that creates factory jobs? A leading steel executive has shown the way for steel. The price of steel, he said, must be raised to the profit level. This is axiomatic and applies to every industry. But it would be a physical impossibility to get the managers of the nation's 6½ million farms together to plan a concerted effort and establish price limits. It is clear that *only the Government can provide the way.* If the price the farmer receives for his wheat, corn, and cotton is the determining factor in this whole economic equation, would it not seem practical that the Government must regulate the prices of these commodities?

Many people say they do not believe in price fixing, that it would be a dangerous experiment to fix farm prices. They bring up illogical arguments such as the one I quoted at the start of this article. Such people do not know that under our capitalistic system it is the value of the annually created new wealth which comes out of the ground that regulates the national income. National income is the income of all the people in all businesses of the country. And it has been clearly shown that the value of the raw-material wealth, multiplied by 7—the normal turnover of the dollar—is the measure of the national income. That is why I say,

boost agriculture's income to 17 billion dollars; that will result in a total national income of 119 billion dollars.

If all people are to have jobs at good wages, all factories must operate and the farmers must have equally good wages from the production of their farm crops. Mines must run to capacity to employ their workers at good wages and the oil wells must produce their "black gold." Then we can have that income. It can be done. It must be done if the United States is to continue as a capitalist nation and a great democracy. The farm problem is not new in America nor in the world. Two hundred years ago Oliver Goldsmith wrote of his native Ireland:

Ill fares the land, to hastening ills a prey,
Where wealth accumulates, and men decay.
Princes and lords may flourish or may fade—
A breath can make them, as a breath has made;
But a bold peasantry, their country's pride,
When once destroy'd, can never be supplied.

The peasantry—their country's pride—were not tenants; they were independent proprietors and businessmen. In America today it is the farmers, sons of those sturdy pioneers who blazed the trail across a continent to build a great nation, who are being dispossessed by a ruthless money power which exacts the last cent of debt, unmindful of the fact that a bold peasantry once destroyed can never be supplied.

A balanced economy will save the situation, As things stand, the United States imports goods it should produce and puts men on WPA (work relief) instead of putting them to work producing the things it needs. It plows under sugar cane and cotton in order that it may import more sugar and cotton substitutes. Meat canneries in Europe and South America operated with American capital cut the production of meat animals which eat American corn and wheat. In the South the poor go half clothed and sleep on shucks because there is too much cotton, the plant which produces clothing and mattresses.

Why import, except the things which cannot be and are not produced in one's country?

No, if citizens of the United States (or of any other nation whose case is parallel) want to insure their prosperity and their jobs, then let them demand the re-creation of their nation's basic spending power. Give agriculture a fair and fixed price for its products, not contaminated by speculation, and see the wheels of industry go round.

NO—Cornelius J. Claassen

If it is true that price fixing has solved or will solve America's agricultural problems, then it is true that we can all get rich taking in each others washing. I do not subscribe to either proposition.

The Agricultural Adjustment Act probably does as equitable a job of price fixing as can be accomplished, and agriculture, under existing circumstances, has reason to be grateful for it. It has gone a little way toward alleviating the economic injustices with which the farmer has long been burdened. Yet I am as far from regarding it as an ideal solution to any part of our economic problem as I am from recommending artificial respiration as an ideal way of getting breath to any but a victim of asphyxia.

I am as much opposed to price fixing in agriculture as I am against it in business or labor. Unfortunately for the farmer it has existed for a long time in business and labor, and his price ills have their foundation in that fact.

Artificial prices in the city began the trouble. Artificial prices on the farm will not end it—cannot, at the best, do more than equalize the score for a fleeting moment. Surely we may hope for something better than that.

Our thinking on the subject of economics would be much clearer if we would remember what we already know—that wealth is not dollars but goods. The wealth of the farmer cannot be measured by the fact that he gets 10 cents or $10 a bushel for corn. The thing that matters is the number of bushels of corn he must exchange for what he needs or wants. This has all been said before, and said better. It was old stuff before the fall of the Roman Empire. And it may well be that the Empire took its nose dive because Roman politicians and businessmen were no more impressed with this economic fundamental than are American politicians and businessmen.

While labor and business maintain their present rigidities of price structure—artificially high wages, artificially high prices—as they have long done, it will always be difficult for the farmer to buy their products, and the highest point at which we can fix a bottom to the prices of farm products will still be too low to equalize the purchasing power of the farmer with the artificially high wages of the railroad fireman, the plumber, the carpenter, or the machinist.

For if we continue to raise farm prices artificially, it is certain that further increases in wages will be demanded and granted in the cities as a result of the increased cost of living. Soon everything the farmer desires to buy will of necessity rise

in price also, until the additional farm income brought about by price fixation has been absorbed, and the farmer finds himself exactly where he was in the beginning.

As long as weather conditions influence the growing crops; as long as the grasshopper and the boll weevil and other ravagers continue to prey upon the products of the farm, and as long as we have erosion and floods and dust storms, the fixing of farm prices will be a long way from solving agriculture's principal problems.

It is quite reasonable to suppose, on the contrary, that its continued existence will retard the establishment of a sensible, balanced agriculture in the United States. There would never have been 10-cent corn, for example, if artificially high land prices and artificially high land rentals had not encouraged the Midwestern farmer to concentrate most of his efforts upon growing a cash crop. At the other end of the cycle, inordinately high prices in the past have encouraged inefficient farming methods, and the farming of marginal lands that never should have been broken with the plow.

Continuance of price fixing, I fear, may encourage the inefficient farmer to keep on at what for him is certain in the end to be a losing game, and may retain in crop production land which, at better than average prices, can scarcely justify the labor expended.

But perhaps the greatest reason why I would not like to see price fixing continued as a permanent feature of farm economy is the rise of farm chemurgy.

The use of farm products in manufacturing paint, plastics, clothing, and auto fuel, if its present progress is continued, will do away with farm surpluses at a not-too-distant date, but the success of the farm chemurgy movement depends, like any other industrial enterprise, on the ability of the co-operating manufacturers to produce by chemurgy better products at low cost. Obviously, the maintenance of farm prices at an artificially high level will not encourage the advancement of chemurgic industries.

On the several hundred farms which my organization manages we are bending every effort to induce maximum production *at low cost*. Obviously, under the circumstances, we are mighty happy to take advantage of the AAA benefits. But we'll be still happier when the necessity for that is gone, which will be when American farmers can buy the equipment they need for low-cost production at prices fairly based on efficient manufacture by reasonably paid labor.

As long as we nourish the illusion that high wages are the

cause and not the effect of prosperity, we shall continue to have an unbalanced economy, a restricted farm market, and widespread unemployment.

Instead of continuing to fix the prices of agricultural products, let's unfix the artificial prices of industry. In *The Problem of Poverty* John Rustgard says:

This could be done by allowing the wage scales in the cities to be placed upon a competitive basis. To do so would result not only in equalizing the earnings between the different classes in the city, but in equalizing the earnings between the farm and the city.

"There are those who raise their arms in horror at such a suggestion. They fear that competition in the labor market would result in oppression and ultimate pauperization of the worker, and that capital would confiscate all the earnings.

"What would happen if the laws of Nature were allowed to make the desired adjustment without human interference?

"The wages in the cities would be equalized by lowering the artificially high ones on the basis of comparative market value of the services. The resulting lower cost of production would stimulate industry and absorb all available labor."

Mr. Rustgard assumes, I suppose, that lowered production costs would be instantly reflected in consumer prices. Both these ideals, of course, depend on simultaneous conversion to sanity of selfish, nearsighted businessmen and equally selfish and bullheaded labor leaders.

What the United States needs is more businessmen like Henry Ford, who is mainly responsible for the vast production and widespread of sharing of automobile wealth; and more labor leaders like Sidney Hillman, of the Amalgamated Clothing Workers of America, who understand economics so well that his announcement of a 15 percent cut in wages once drew cheers from workers' representatives.

What we emphatically *don't* need are businessmen who lay off employees at the first sign of a restriction in their markets, but maintain their high prices as long thereafter as they can; and labor leaders who acquiesce in such waste and robbery as are reflected in the Interstate Commerce Commission's wage bulletin of 1938, in which appear the astounding figures, under the heading "Time paid for, but not worked," of 17,357, 174 days, costing the already overburdened railroads more than 120 million dollars.

There may be some poetic justice in the spectacle of the autocratic industry whose leader once said, "The public be damned," being gouged to the tune of 120 millions by an equally callous

labor hierarchy. Our smiles are somewhat embittered, however, by the knowledge that we are all indirectly the victims of this economic highway robbery. Most of us add the cost of this waste to our products, thus selling fewer of them, but the farmer can't, so he is penalized not only when he buys, but also when he sells.

It is strange how many businessmen consistently overlook the fact that most of the great fortunes have been built by widening consumer markets through low prices. Woolworth and Kresge are obvious examples of this enlightened selfishness. Even in England, where business accomplishment is in most respects far more difficult than in the United States, there is a man who has given away 60 million dollars in the last 15 years and is still reputed to be the wealthiest man in the country. This relatively young billionaire, Lord Nuffield, started in the car-making business about from scratch, at the end of "World War 1." In 1921 the market was glutted with used-car sales by veterans, and every manufacturer except Nuffield laid off employees and curtailed production. Nuffield, on the contrary, cut his prices, made more cars, and sold them in a market hitherto closed because of high prices. It *can be done.*

I wish every supporter of price fixing might read, learn, and inwardly digest that extraordinary article in last September's *Readers Digest* entitled *America Unlimited,* by William Hard.

Mr. Hard sounds a loud, clear trumpet call, summoning politician, businessman, laborer, and farmer to a new crusade, in these words:

"We have tried combat between industries. Every industry, under its NRA code, was out for itself. Wages rose. Prices rose even faster. Production went down. NRA was not killed by the Supreme Court. It had already killed itself.

"We are here today to reverse that NRA principle. We are here to see if we can concertedly increase production and concertedly move prices down as efficiency goes up. Nobody can do it to the maximum all by himself. We have to do it all together. And we had better do it, while we can, as free men.

"Free men can do it much better than men unfree. We seek here simply all your individual wills lifted into a national will and into a national consciousness of the ever-lasting moral and economic truth that you take out only what you put in and that the way to get is to give. We are going to give work and price. And we are going to get wealth and employment—and more wealth.

"In a word, we here pronounce the death of that monster which we have created by our own internal conflicts: America in eco-

nomic civil war, America blocked, America stopped. And we here restore America Unlimited."

With such a vision of national sanity before me, how could I possibly say "Yes" to any proposals that contemplate continuance of price fixing.

Nebraska's Tractor Tests

Condensed from The Western Farm Life

Carlton L. Zink

Engineer in Charge

IN the period of 1915 to 1920 a rapidly growing interest in farm tractors was evidenced throughout the Central and Mid-Western states. Large, well attended tractor shows or plowing demonstrations were held at a number of points in this area. Many farmers were sold tractors on those occasions by "super-salesmen" who neither knew or cared whether or not the claims made for the tractor they were selling could be substantiated. Some other sales organizations "leaned backwards" in their efforts to make sure that the machines that they sold would do all that they claimed and more.

The very meager information as to the probable performance of the various tractors and the divergent attitude of sales groups toward such information as they did have, together with an almost complete lack of tractor experience on the part of the farmers, all led to many confusing and disappointing situations. In other words, the farmer did the experimental work for the manufacturer and paid for the privilege.

The Nebraska Law

Representative W. F. Crozier, a farmer from Polk county, Nebraska, was one of those in his community who had bought the comparatively new type of farm power. His experiences with two or three different units of his own and his observations of the experiences of his neighbors seem to have convinced him that sales claims were commonly excessive. Also that many machines were little more than experimental, and that many manufacturers were making no pretense of maintaining stocks or parts or other service. In his opinion conditions could be materially improved and this improvement hastened and made more effective with the enactment of legislation with these objectives.

In the 37th session of the Ne-

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braska legislature (1919), Representative Crozier introduced House Roll 85, the title of which read: "A bill for an Act to provide for official test for gas, gasoline, kerosene, distillate or other liquid fuel traction engines in the State of Nebraska and to compel the maintenance of adequate service stations for same." This bill passed and the Nebraska tractor law became effective July 15, 1919.

How It Operates

Stated briefly, the provisions of the law are that a stock tractor of each model sold in Nebraska shall be tested and passed upon by a board of three engineers under state university management; that each company, dealer or individual offering a tractor for sale in Nebraska shall have a permit issued by the State Railway Commission;

That permit for any model of tractor will be issued after a stock tractor of that model has been tested at the university and the performance of the tractor compared with the claims made for it by the manufacturer;

That a service station with full supply of replacement parts for each model of tractor shall be maintained within the confines of the state and within reasonable shipping distance of customers.

The testing work was assigned to the agricultural engineering department and L. W. Chase. O. W. Sjogren and E. E. Brackett comprised the board of three engineers required by law. C. K. Shedd was selected as engineer-in-charge and his first duties were to select and purchase some testing equipment and design and build other pieces of test equipment and plan the various form and blanks as well as outline the proposed test procedure.

Early Problems

About the time that the law became effective, the representatives of a large number of tractor manufacturers met in Lincoln, Nebraska, to discuss the probable effect of this law. Some were of the opinion that there should be united resistance by legal action, but they were in the minority.

One phase of the situation which seemed to cause greatest concern was the fear that there would be similar laws enacted in several other states with ensuing confusion and expense. The suggestion was made that any testing program should be under federal supervision, but this did not receive much support.

The board of testing engineers discussed their plans fully and frankly with the group and in general the plans seemed to be approved after those representatives realized that the proposed policy of the board recognized the interests of both farmer and manufacturer; that the board was endeavoring to set up a "measurstick" that would be applied

to one and all, that would show good points and desirable characteristics as well as reveal shortcomings.

During the 20 years of testing that followed, the board has consistently tried to avoid rules or test procedure that would retard progress or hinder the development of better tractors.

The original law provided that reports of tests "shall be posted in the agricultural engineering department of the state university," and also declared it "unlawful for any tractor company operating in the state of Nebraska to publish extracts from such official tests for advertising purposes, without publishing the entire report."

The Board decided that there would be smaller probability of mistakes, if copies of all reports were made easily available to all who were interested. In the 20-year period 18 bulletins and circulars have been published, totaling over 150,000 copies. Individual reports have been issued on 328 tests and thousands of copies have gone to interested persons in agricultural communities all over the world.

Reports Available to All

A three-page report of each test is issued soon after the test is completed, and an annual bulletin is compiled from these reports. Copies of the original three-page reports are available at 5 cents a report (on one tractor) from the Department of Agricultural Engineering, College of Agriculture, Lincoln, Nebraska. By remitting $1.00 those desiring future reports without delay will receive for 1 year without further requests or other cost one copy of all reports or bulletins issued, referring to tractor tests. Each one will be mailed as soon as possible after its release.

The latest tractor test bulletin, No. 325, summarizing the test results on tractors which were on the market January 1, 1940, is now available. Single copies may be had on request at no charge. Simply write the Experiment Station, College of Agriculture, University of Nebraska, Lincoln. For larger quantities, a charge of 10 cents a copy is made.

The 20 testing seasons have brought many new developments or refinements in every part of the tractor. Some of the more outstanding have been angle lugs to spade lugs to rubber tires, improved carburetor, manifold, and combustion chamber design, improved fuels, open cast gears on plain or not-too-good anti-friction bearings have changed to high grade cut steel gears on good ball or roller bearings running in an oil-tight case. All these features and more have been reflected in the published performance data on these various tractors. Quite possibly the usefulness of the law as a regulatory measure was fulfilled some time ago but those directly

in charge of this work have cherished the idea that the greatest value would come through the hastening of the development of better tractors.

The Fly—A Farm Problem

Condensed from The Jersey Bulletin

W. A. Pohlman

Illinois

IN discussing a problem of this nature, there are naturally a great many variables to consider, and because of this fact the remarks which we will make further on must be accepted as covering only the underlying principles. Possibly, only a part of them are applicable to your particular property.

There are two distinct phases to the farm fly problem, each of which is equally important in its own sphere. This discussion, therefore, will be divided into (1) prophylactic treatment, and (2) mechanical control. Prophylactic treatment might possibly be given precedence over mechanical control as it gets down to the fundamentals of the problem.

I will not attempt to discuss the life cycle of the fly, but will merely cover those facts concerning it that are pertinent to this discussion. The average range of the fly can be covered by a circle with a diameter of about 1,000 yards. We will grant that there will be some flies driven in by the wind, and some that will be forced to travel to the farm from a greater distance because of a lack of food in their own range, but this percentage of your fly population is extremely small. Therefore, to all intents and purposes, our fly problem is of our own making, and the logical approach to its solution would be to eliminate the breeding spots of these insects on our own property.

In seeking out these breeding areas, we must keep in mind that the two types of flies, with which we have to contend on the farm, breed in entirely different areas. The fly that possibly causes the most annoyance to animals, the tabanid or biting fly, uses one or two mediums for propagation. The most prolific source is a pile of loose straw, where moisture is present, and the other spot is manure, either stacked in the yard or present in the open pasture.

Treatment of yard manure is

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relatively simple, but that in the pasture or rest lot offers another problem, and the number of flies hatched in these latter areas is equally as great as the number hatched around the barn. One method of treating badly infested field areas is to drag brush over the droppings, breaking them up so that the sun and air will dry them out before fly larvae have an opportunity to develop. Of course, we know that this entails some labor and expense, but in heavily infested areas it is time and money well spent to get rid of these breeding sources.

In our surveys we have always strongly recommended that loose straw be removed from shed areas or from spots where the soil is continually damp, but where this is not possible when the straw is used for bedding purposes in calf stalls, etc., we recommend that this area be liberally treated with powdered Borax. Borax is not injurious to animals in any way, and yet it does close these spots as breeding grounds for flies.

The other type of fly found on farms is the scavenger type. While this insect is not as great a source of annoyance to animals as the tabanid, it does worry them by crawling over their delicate tissues. This insect also causes the high bacteria count in milk by spreading germs over the vessels used and by direct contact with the milk itself.

The scavenger fly will hatch in almost any damp area where protein is present, and two of the most prolific breeding areas on the farm for this type of insect are manure piles and areas around old-type privies, and in the spots around the milk house where drainage from the wash racks keeps the ground continually moist.

We have always recommended the use of Borax on all spots of this nature, except in the case of the manure pile itself. With this exception, such areas should be liberally sprinkled with Borax at regular intervals, and should always be treated after each rain. The area immediately adjacent to the manure pile where seepage works into the soil should also receive a Borax application regularly. For the manure pile we recommend the method of treatment suggested by Dr. W. P. Flint, State Entomologist of the Illinois State Department of Agriculture, who says:

"In the handling of manure piles, we have ricked the manure in straight-sided piles six or seven feet high and from 10 to 20 feet across. After manure has been piled this way for about a week it goes through sufficient decomposition and heating so that flies will not breed in it. During the first week, some breeding will take place, even in straight-sided piles. To prevent this, we are now using black tarpaulins over

the ends of piles. When truckloads of manure are hauled to the piles the tarpaulins are pulled back, the manure dumped, and the tarpaulins pulled back again over the manure. These tarpaulins, which are heavily impregnated with wood-preserving creosote to prevent decay of the fabric, confine the heat of the manure, and this, together with the heat from the sun, raises the temperature of the manure to a point where it is impossible for the fly maggots to live. We have found this treatment very effective. It is much more practical than any chemical treatment of the manure."

We also suggest that the floors of barns that are still equipped with the old-type wood flooring—and this is found quite frequently in the horse quarters—be treated regularly with powdered Borax. This medium should be applied very liberally on the initial treatment.

The above, we believe, covers the principal and most obvious breeding spots. It is not possible to search out all the breeding areas for flies that exist on the farm, and while the treatment of known or suspected areas will greatly reduce the fly population, some sort of mechanical control must be relied on to take care of the flies bred in areas not accessible for treatment.

There are many mediums for fly-control which have been used in the past such as sprays, screen traps, poisons, sticky fly-paper, etc., but all of these devices required constant supervision on the part of the farm personnel. Unfortunately, when the human element enters a situation, a breakdown of the system quite often occurs. Therefore, we have recommended in our various surveys that an automatic control by electric screens be used.

There is no set rule that can be made for the application of electric screens to any two barns. Each properly represents its own individual problems and requires a thorough survey by a man versed in the application of the equipment, as there are certain characteristics of fly-behavior which must be considered when the use of electric screens is contemplated.

Many insects are known to show definite color preferences and dislikes, and through research work conducted by a Swiss scientist it has been developed that flies show a marked aversion to light blue. With this knowledge we started a test on the use of this color in conjunction with electric screens. Our first field work was carried on in Iowa, and we selected different types of barns in which to run these tests. Barn No. 1 was equipped with the Louden drop-back windows; Barn No. 2 was of the same type of construction as No. 1, and Barn No. 3 was

equipped with regular slide windows.

We installed electric screen panels on Barn No. 1 at every fourth window, and removed the glass panels from these openings. We retained the ordinary screen mesh on the other openings and left the glass windows in them in the tilt-back position. We painted the mesh a light blue, and covered the inside of the glass windows with a light blue calcimine.

On Barn No. 2 we used an electric screen installation comparable to the one on Barn No. 1, again removing the drop-back windows from the electrified openings. However, the ordinary screen mesh was removed from the non-electrified windows, and the inside of the glass of the drop-back windows at these openings was covered with light-blue paint. The same electric screen installation was used on Barn No. 3, and the ordinary screen mesh in the non-electrified windows was painted light blue.

We observe the actions of flies at these barns as follows: At Barns No. 1 and 3, flies were seen to approach the painted windows, veer suddenly away from them, and then work along the side of the barn until they came to a window protected by an electric screen. As this opening seemed to have no barrier, the flies attempted to pass through and were killed.

A peculiar situation was developed at Barn No. 2, which as stated above was set up without any ordinary screen mesh on the non-electrified windows. Flies were observed approaching the open-drop-back windows from the outside—which had been painted light blue—and were seen to veer away from these openings and work along the barn to a window with an electric panel.

There was only one drawback to this type of installation—without the ordinary mesh in the non-electrified windows—which was not present in the other two installations. That was that when drafts were created by wind direction, flies were sucked in through the open windows involuntarily. However, this occurred only once or twice during our observation period.

There were several other angles developed during our research work that proved quite interesting. Some of the barns at which these tests were conducted had long west exposures, and we found that after the light blue paint was appiled to the windows the temperature of these barns was very materially reduced. Another result was that the blue paint provided a very soft white light which proved very quieting to the animals stabled in the barn.

There was some opposition to the exclusion of direct sunlight from the barns by sanitation inspectors who reason that such ex-

clusion of sunlight would increase the bacteria count in the barn. However, facts developed in these tests proved contrary to their expectations; in fact, one of the original test farms in the research program has for three consecutive years held the state record for low bacteria count in milk produced in these barns.

After three years of field work with the use of blue paint, we are now satisfied that this method is practical. Accordingly, we are recommending it in all data we release to dairy herd owners, and we have also incorporated it in the fly-control program which we recommend to other users of electric screens.

Raising Calves on Wire Floors

Condensed from Certified Milk

H. H. Tucker, M.S.

Formerly Associate Professor of Dairy Husbandry, New Jersey State Agricultural Experiment Station, New Brunswick, N. J.; Educational and Research Bureau For By-Product Ammonia, Columbus, Ohio

THE good livestock breeder is always in search of means or methods for improving his animals either through breeding or environment. The amount of milk or butterfat a dairy animal will produce is determined both by its genetic constitution or inherited ability, and by its environmental conditions, which include feed and care. Neither of these can make up for deficiencies in the other. The best of care and feed will not make a phenomenal record from an animal which has inherited low production, nor will a good cow make her best record under adverse conditions. Environmental conditions affecting any one record are not only those of that particular year, but the culmination of those factors extending back to the time of conception of that animal.

Animals which are stunted or improperly grown cannot develop the physical characteristics which will give the maximum production for their inherited ability. It is therefore necessary that animals do not have set-backs which will inhibit their growth temporarily or permanently. These setbacks are most likely to occur immediately after birth, and until the animal has become adjusted to its new way of living.

It is therefore very essential that these handicaps and adjustments be reduced to a minimum. It is bound to be a great shock to a new-born calf when it is taken away from its mother and forced to obtain its nourishment by

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some other method than that given it by instinct. This adjustment is made more readily by some individuals than by others. Often a fasting period of 24 hours is necessary before the calf can be persuaded that there is some other way to obtain its food. In such a case the hunger urge has partially overcome the original instinct. During this same time the calf has been going without food, and weakening itself by living from its supply of stored energy. Various methods of feeding calves which simulate nature's methods have very largely eliminated this undesirable transition period. The nipple pail is accepted so readily by the young calf that it is unnecessary for the calf to miss a single feeding, or to overexert itself by trying to educate its stubborn master.

The next shock which the young calf receives is when it is compelled to lie on a cold wet bed, and try to increase the temperature of the surrounding concrete and atmosphere. This second shock often lowers the calf's resistance to a point where it is an easy pray to the ravages of scours, colds, bronchitis, and pneumonia.

Modern barns, ventilators, cork brick floors, improved stalls, automatic watering devices and special feeds have all been developed to aid the dairy cow to produce up to the amount permitted by her inherited ability. Even with all this the calf stall continued to be a cold damp undesirable place unless great amounts of bedding were used and this changed often. Wire floors have overcome many of these undesirable conditions around the calf pen. The first attempts to use wire floors at the New Jersey Experiment Station were in the late fall of 1936. Since remodeling of the calf barn was impossible at that time, as it often is with farmers, these floors were made on frames so they could be placed along a wall or panel and calves tied on them. These frames were made 4 feet wide to correspond to one of the widths of wire obtainable and to the needs of the calf. They were made 5 feet long so as to keep them from being too heavy and cumbersome. These frames were then covered with No. 9 gauge fence wire and then with ¾ inch mesh No. 11 gauge woven wire. This wire had been galvanized after weaving to protect it from rust.

The heavier wire was used to strengthen the frame and help support the ¾ inch mesh wire. This wire was securely fastened by stapling, and the wire turned down over each end for about 2½ inches to make the structure more rigid. A 2 x 4 on edge was then bolted on top along each side. The frame was placed on legs six inches high so as to hold it up away from the floor, thus permitting ventilation under the

wire and easy removal of any bedding which might fall through the wire. The 2 x 4 along the front and back sides helps to hold the bedding on the sections.

This floor has given wonderful results in several ways. The bedding saved by this method is approximately 50%. The labor required to care for calves by this method is greatly reduced over that normally required. Enough labor was saved in the first six months of use to more than overbalance that required to build the sections. The bedding saved during this same period would more than pay for the cost of all wire and lumber. The great gain, however, was in the increased growth and development of the calves, and decreased losses due to death and sickness.

By using this new method, there has been a much more uniform growth among the calves, and no stunting of growth has resulted. In comparing the growth figures of calves raised we find that some of the calves raised in stalls without wire floors were just as large at 4 months of age as those on wire floors. However, there has been much less sickness among the calves raised on wire floors, and fewer calves have been lost.

It was observed that calves raised on wire floors lay down much more than calves on well-bedded insulated floors in the same barn. The question has been raised as to whether calves tied on these floors obtained enough exercise. It was further observed that calves tied on these floors did not object to the springy condition of the floor, but would jump around and exercise sufficiently even though they were not turned out for exercise. The tying of calves has definite advantage in that more calves can be raised in the same space, and they cannot crowd each other away from feed. Also, the evil of one calf sucking another is avoided. Fewer difficulties are encountered at feeding time, and more individual attention can be given calves where they are kept separate. If conditions would permit, no doubt it would be better to have separate pens for calves with the entire floor area covered with wire floor.

The wire for these frames cost us 19½ cents per square foot in the fall of 1936 when this wire was purchased in rolls of 100 lineal feet. Present prices would be somewhat higher. The cost of the wire and lumber was approximately $6 per frame or 30 cents per square foot. The cost of labor for construction was approximately $1.25 each, making a total cost of $7.25 or 36½ cents per square foot.

These sections have been in use for over a year. They are still in good condition, and should last for at least two more years. Calves have been raised on these

floors until they weigh 350 to 400 pounds without damaging the floors.

An all metal frame with advantages over the wire and wood frame, was then developed. Woven wire on metal frames and perforated sheet metal on frames were considered. After much investigation the possibility of using expanded sheet metal on metal frames was developed. This material, similar to metal lath but made from much heavier iron, was used. Three quarter inch No. 9 expanded metal was found to be very satisfactory for calf floors. This material is usually manufactured in sheets 4 feet by 8 feet, so frames were made of this size. The frames were made from 2-inch angle iron. The expanded metal was welded into the angle iron frame in such a way as to supply a 2-inch upright ridge around the edge of the frame to hold the bedding. These frames were mounted on six-inch adjustable legs made from 1¼-inch pipe. This permitted cleaning under the frames very readily. These completed sections weigh approximately 125 pounds each and are much lighter in weight than oak sections of equal size. The cost of these metal sections is slightly more per square foot than that of the homemade frames made of wood and wire. The additional cost of these metal sections is no doubt justified, since they are much stronger, will last longer and can be purchased in any quantity desired. They also are lighter in weight, more easily cleaned and present a better appearance than do wood and wire sections.

A fairly recent development has been to construct sections 1 foot wide and 4 feet long from this same expanded metal. With sections of this size it was not necessary to construct the metal frames. The expanded metal was cut approximately 19 inches wide and 4 feet long. Three and one-half inches were bent down along each side to form a channel 3½ inches deep, 1 foot wide and 4 feet long. The 3½-inch sides of the channel serve as legs. These were then placed side by side to form a continuous bed 4 feet wide or they can be used to cover the entire area of a pen. These sections do not need an upright edge to hold the bedding, since they are not so high but that the straw or bedding will drape over the edge of the elevated bed. These sections have advantages over those previously made in that they are stronger, lighter, more easily removed for cleaning, and cheaper. They are more convenient for removing the calves since they are lower. These sections can be purchased for $1.10 each F.O.B. the factory or at a cost of 27½ cents per square foot. This price for the completed small section is less per square foot than the cost of material

needed to construct the wire and wood sections.

Expanded sheet metal is made from copper bearing steel which makes it very rust-resistant and durable. Sections now in use are painted, galvanized and untreated to determine the advantages of the various treatments of the metal. These sections have been in use for nearly 3 months, and none of these show any serious signs of rust or weakening in any way. They lend themselves readily to covering any type or size of floor. They can be fitted in between curbs or fastened together to form any size bed.

Bedding for any of these floors must be coarse enough that it will not fall through the openings. Long straw, meadow or swamp grass or waste hay can be used very satisfactorily. Manure can be removed or allowed to mix with the bedding, and urine will run through to the lower level without making the bedding wet. With young calves it is unnecessary to change the bedding oftener than once a week. With older calves it is only necessary to change the bedding once or twice a week instead of every day, as is often the case on other floors to keep the bed dry.

The same type of floor is being tried out in cow stalls and offers great possibilities for keeping the cows much cleaner and healthier, decreasing labor and bedding costs, and producing a better quality milk. Similar methods have been designed for other classes of livestock including beef cattle, sheep, swine, horses and goats, as well as poultry, fur bearing animals and pets. Many of the same advantages should be obtained as with calves and dairy cows.

The dairyman with the most efficient production has always been rewarded with the greatest profits, or at least with the smallest losses when all other factors such as markets were equal. With present economic conditions, health regulations and competition, the necessity of efficient production is still more essential. We must therefore strive to have dairy animals that are: (1) improved in their inherited ability; (2) developed to produce for a longer period of time, and (3) raised as cheaply and efficiently as possible. This new type of floor may help in achieving these last two goals. If so, it is worth consideration.

A Scholarship in Work Experience

James J. McEntee

Director, Civilian Conservation Corps

THE story of the Civilian Conservation Corps and its role in the fight to prevent land and soil devastation throughout the entire United States has been told again and again. The CCC's record in the prevention of soil erosion, the planting of new forests, the development of recreational areas and the protection of our timbered resources is an impressive one—one of which all of us have cause to be proud. Yet the Corps' conservation record, important as it is, is no more impressive than the role that has been played by the CCC in the field of human conservation.

Every community in the United States has been touched in some manner by the human conservation activities of the Corps. Its young men have gone into the CCC camps. These youngsters have sent allotment checks aggregating more than $550,000,000 back to dependents in the communities from which they were enrolled. Federal funds have been expended throughout the nation for food, clothing, shelter and equipment for the men and for the conduct of the work programs. Throughout the years that the Corps has functioned, these funds have served to conserve our resources, build up the health and earning capacity of our young men and to furnish orders to industry that have helped thousands of men to stay upon private payrolls.

But what of the young men themselves? What are they like when they enter the Corps, and what are they like when they leave? That is a story in itself. The CCC is not a dumping ground for misfits—for so-called problem boys, and it is not a resource that meets the need of every young man who applies for selection.

It is not so well-known that CCC enrollees are actually *selected,* and that the job of selection is one which requires a thorough knowledge of the purposes of the CCC, the requirements of the enrollee's job (including all of camp life) and his opportunities for training, employment and advancement. For every enrollment there are many times the number of applicants needed to fill vacancies in the camps. During the April, 1940, enrollment period, 183,000 young men applied for selection to fill

62,221 places. To pick from such a great company of young men best suited for enrollment, requires discriminating judgment.

There are, of course, legal requirements as to age, citizenship, marital and employment status. Those selected must be 17 to 23 years old, have full United States citizenship, be unmarried, unemployed and in need of employment. (Approximately 10% of the enrolled members of the CCC are War Veterans. These older men are housed in separate camps. While the work projects are similar, the program of training is quite different. The enrollment of these men does not alter the fact that the Corps is essentially a program for young men.)

The "typical" junior enrollee, according to his statistical picture, is 18 years old, has completed eight years of schooling, is 5 feet 8 inches tall, weighs 144 pounds. He comes from a family in the lower income brackets and has never had a regular job in his life. He hails from every corner of the United States. Between one-fourth and one-third of all CCC enrollees have lived all their lives on farms. Another fourth come from rural non-farm areas, and the rest from cities.

It is a fairly simple matter to check the legal qualifications of applicants for enrollment, but that is just the beginning. Far more important to the CCC are the personal qualifications of its men. They must be boys who will adjust to camp routine, boys who not only *need* this "scholarship in work experience" but who *want* it.

Since the first mass enrollment of 250,000 young men in the Spring of 1933 "selection" rather than "collection" of men has become a fact instead of an ideal. During the same period "relief-work" has been replaced by "work-training" in CCC terminology. It is the earnest purpose of the CCC administration that each young man who enrolls in the CCC shall go home a better workman and a better citizen. And to this end selection of the boy is the first step. There are four characteristics which seem to result in successful enrollment in the Corps—maturity, dependability, mental alertness and interest in the Corps as a work-training opportunity. Every selecting agent must look for these qualities.

Boys must be matured enough to undertake the work of the camp, which is often strenuous, and to make proper adjustment to camp life.

They must be dependable. A youth who can be depended upon when his superiors are not watching him, to abide by the spirit of camp regulations and policies, is an asset in a CCC camp. This means that he must be a willing worker;and he must be worthy to be trusted with Government

property. He must have a sense of the ordinary moral concepts of right and wrong.

He must be mentally alert. In other words, he must have sufficient mental capacity to learn to do one of the various camp jobs well. This does not mean brilliance, but does mean that amount of mental equipment which will assure interest and progress.

Boys who are interested in the CCC for the job training and experience they can obtain make the best enrollees. No youth who has been urged against his own desires to apply for enrollment, and no applicant who regards the CCC as a mere stop-gap or a vacation, is likely to make a good enrollee. The CCC is not primarily a relief program; it is a work and training opportunity for young men. It is important therefore that applicants should understand the nature of the CCC program and should not be selected for enrollment unless they regard it as a work and training opportunity.

When a young man is enrolled in the CCC he is advised of the nature of his responsibility as well as his opportunity. He is told that it is a privilege to be enrolled in the CCC; that it is an opportunity sought by thousands who cannot be accepted; and that responsibility rests upon him to contribute the best that is in him. He is encouraged to make good.

The new enrollee is told that the work he will be given to do is important work; that the projects which engage CCC youths represent some of the most important undertakings of the Federal Government. Their justification is clear-cut and farsighted. It is to save the natural resources of the United States and to develop them both for the benefit of this generation and for future generations; it is to reduce the hazards of floods and forest fires which yearly destroy life and property in many sections of the country; it is to demonstrate to farmers how to retain the top soil of the land so that it will not be washed down rivers or blown away—these examples are typical of the conservation purposes of the Corps.

Here is a partial list of CCC "project" jobs, not all of which, of course, are carried on at every camp, but which is representative:

Auto mechanics
Bridge construction
Bulldozer operation
Cabin construction
Carpentry
Concrete construction
Diesel-engine operation
Drafting
Jackhammer operation
Landscaping
Large-scale cooking
Logging
Office work
Road and trail construction
Road-grader operation

Sawmill operation
Sign painting and sign making
Small dam construction
Steam-shovel operation
Stone masonry
Surveying
Telephone-line construction
Tool sharpening
Tractor operation
Tree-nursery work
Truck driving
Welding
Wildlife management

There is ample proof that young men, in the 17 to 23 year age group, need the work-training offered by the Corps. Sixty-three percent of all the men accepted for enrollment in the CCC in January had no previous work experience whatsoever, and another 12% had worked less than four months. The Corps takes in each year a quarter of a million young men who are raw material for work experience.

Camp officials are well aware of the far reaching importance of their jobs in moulding the lives of these young men. Both camp life and work on the project are designed to give to these raw recruits the supervision, stimulation and incentive that does, in remarkably short time, turn vigorous and ambitious boys into capable workers.

Each CCC camp is a small community organized for the utmost efficiency. It is a self-operated "town" of 200 inhabitants. It has a "store," usually a small newspaper, a library, a school building, a community dining room, recreation hall, an athletic field, a hospital, and facilities for adapting the camp assembly room as a "church." Under general supervision enrollees operate all of these activities. The conduct of these activities is the first opportunity most CCC enrollees have had to assume social or business responsibilities.

Every enrollee has a chance to advance to leadership. There are approximately 25 jobs as leaders and assistant leaders to be filled in every camp.

Each camp has a leisure time program of education and training. Many enrollees wish to obtain additional training which has direct relationship to the work they are doing in camp. Some desire to complete their grade school or high school education. Others participate in special short-unit courses of information and instruction related to their interests and abilities. And those who have never had opportunity to do so, learn to read and write.

The fact that a CCC camp must carry on all of these various work functions and social and cultural activities is indicative of the wide variety of opportunity for experience and training which exists in the CCC. This variety of work experience is seldom found in other industrial establishments in which inexperienced youths can be employed.

Every taxpayer is interested in the results obtained from the expenditure of his money. The work done by CCC men speaks for itself. But what of the return on investment in human life? What of the personal gains which have been made by the enrollees who return from the camps to take up their lives among their former neighbors? These are set forth concisely in a recent report issued by the Office of the Director:

"The CCC is building strong, healthy, clear-eyed, vigorous young men whose resistance to disease and other ailments has been greatly increased. These youths are gaining essential physical assets at an early age, when they are most susceptible to physical development, and when vigorous *health* will prove of most enduring value.

"Camp life is not only offsetting the undesirable effects of idleness, but is at the same time *teaching the youths how to work*, how to follow instructions, to use their native intelligence in performing their jobs—traits which every employer is looking for when hiring new men.

"In many instances enrollees are learning special *skills* which enable them to find jobs much more readily after leaving camp.

"The *discipline* and regularity of camp life is very frequently spoken of by the enrollees themselves as they look back upon their camp experience as one of the most effective contributions to their habits and character. Regular hours, definite responsibilities, adequate sleep, and three square meals a day—these new experiences are a revelation to the members of the Corps of the additional energy and assurance which springs from regularity of life and work.

"*Neatness and cleanliness,* and knowledge of personal hygiene are a part of the program from which no enrollee can fail to benefit.

"Living together in barracks with nearly two hundred other young men frequently has a most desirable effect in teaching enrollees to respect the rights of others and *to be tolerant* of the other fellow's point of view. It also teaches them to be good sports, to take minor defeats without flinching—traits of character which will stand them in good stead later in life.

"In many cases the shouldering of the obligation of providing a major part of the *family support* has developed a sense of responsibility within these young men, most of whom have never known what it is to feel the satisfaction of self-support and the self-assurance of being of assistance and value to others.

"*Self-reliance* and a brighter, broader outlook on life go hand in hand as among the most important contributions of the CCC program. Fear is replaced by as-

surance and discouragement by ambition."

Not all enrollees receive every one of these benefits in a major degree, but rare is the individual who does not profit from several of them to noticeable extent. In all cases the boy who makes good in the CCC learns to work, and to develop job habits and morale which are essential to success in any employment. The Civilian Conservation Corps enrolls inexperienced youths who are eager for a chance to learn to work. It helps them to establish proven work qualifications. It gives youths an unparalleled opportunity to develop into men.

Wheat

Pilot and Rival are two new wheat varieties that are not only resistant to stem rust but also leaf rust and many strains of stinking smut, or bunt. These new varieties developed at the North Dakota Station are, in addition to being resistant to the above-mentioned diseases, also high-yielding and of good bread-making qualities.

A new leaf-rust-resistant, soft red winter wheat, called Wabash, has been developed at the Indiana Agricultural Experiment Station. This new wheat variety is not only resistant to leaf rust, which is common throughout the soft red winter wheat belt, but also to the mosaic disease which causes trouble in some sections. Although it is a soft wheat, it has good quality and is high-yielding.—*E. N. B.*

—*Successful Farming*

Rapid Growth—Quick Feathering

Condensed from New England Homestead

Dr. F. A. Hays

Research Professor in Poultry Investigations

RAPID growth is desirable in birds bred for meat production and in birds bred for egg production. As a meat producer, the most economical gains occur in the early life of the chick. In general, rapid growing chicks are likely to carry superior fleshing at an early age, making them especially desirable for broiler purposes. Rapid growth associated with early sexual maturity is an important characteristic of superior production-bred birds. Experienced breeders prefer large pullets at the common housing age of about six months.

The weight of chicks at hatching is largely determined by the weight of eggs set. On the average, chicks will weigh when hatched about 60 per cent of the fresh weight of the eggs from which they come. If the hatching eggs weigh 26 ounces to the dozen each chick will weigh about 1.3 ounces and a hundred chicks will weight 8.1 pounds. Small eggs will give small chicks and very large eggs very large chicks. Under general conditions, eggs weighing more than 27 ounces to the dozen do not hatch as well as 26 ounce eggs so that there is no particular advantage in incubating extremely large eggs.

Male chicks will be about the same weight as females when they come from the incubator. At two weeks of age males will be nearly 4% heavier than females. When chicks reach the age of four weeks, males are about 8% heavier than females. At sixteen weeks, males are over 28% heavier than females. At the age of twenty weeks, males are about 26% heavier than females. This sex difference in weight ranging from 25 to 30% persists from sixteen weeks throughout the life of the bird.

In Rhode Island Reds and White Leghorns the weight of chicks from different sized eggs has been determined. In Reds there was a difference in weight at four weeks of about 27% in chicks hatched from 20 ounce eggs compared with those from 26 ounce eggs. At the age of 21 weeks, there was no significant difference in the weight of chicks from large and small eggs. The fact is very evident from available data that chicks from large

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eggs would be superior for broiler purposes.

Rhode Island Reds have been bred for egg production for a period of 25 years at the Massachusetts Agricultural Experiment Station. Heavy body weight has been considered a desirable character to breed for. The weights obtained may be considered desirable in Rhode Island Reds and Plymouth Rocks bred for egg production. The chicks averaged .08 pound as they came from the incubator. At two weeks the average weight for males was .2 pound and for females .19 pound. At four weeks of age the average weight of all chicks was .69 pound. When eight weeks of age the average weight of all chicks was 1.7 pounds. Weights taken at twelve weeks showed an average for all chicks of 3.21 pounds, for males alone 3.61 pounds and for females 2.94 pounds. Pullets were placed in the laying houses at 160 days of age and averaged 5.16 pounds each. Pullets average to lay their first egg at 190 days of age and their average weight at this time was 6 pounds. Males at 160 days of age averaged 6.25 pounds. Body weight increased in females in the laying house until they were about eleven months old when they weighed 6.68 pounds each.

Rate of growth is known to depend on a number of inherited factors. Through selective breeding it not only is possible to increase the rate of growth but also to increase the mature weight. Selection is most effective when carried out on the family basis. The first approach is through the use of hatching eggs weighing around 26 ounces to the dozen in pedigree hatching. The rate of growth of the individual families of chicks should be studied. To improve the early growth, weights may be taken at four, eight, and twelve weeks. Weights are easily taken at eight weeks when the sexes are separated. A weight at twelve weeks is especially important because most broilers are sold at this age. Those families of chicks that show the greatest average weight and the highest degree of uniformity in weight at these early ages should furnish future breeding stock to improve the rate of growth. Weights should also be taken on the pullets when placed in the laying houses and upon cockerels at about six months of age. These records may be used as a guide for the breeder in combining large size with early sexual maturity. Large size at sexual maturity is especially desirable from the standpoint of egg size. Such a method of selective breeding will increase the rate of growth and the mature body weight in a comparatively short time.

Rapid feathering in the chick is desirable to protect from cannibalism and is of marked economic importance in the broiler

market. It is possible by feeding methods and by changing brooder house temperatures to produce a noticeable change in the rate of chick feathering but such effects are insignificant compared with the effects of inherited factors.

The White Leghorn furnishes a good example of the sex-linked type of rapid feathering. This type of feathering shows up first in the well-developed wing quills as the chicks are taken from the incubator. The next effect of the sex-linked type of rapid feathering is the tail development in chicks between the ages of one and two weeks. The third stage is the complete feather covering of the entire body in both males and females at about four weeks of age. In the Leghorn the sexes do not differ with respect to the rate of feathering and this type of rapid feathering is recessive to the slow feathering that is typical of the heavy breeds.

The most important type of rapid feathering from the standpoint of the American breeds is the type which produces complete juvenile feathering on the backs of males and females at about six weeks of age. The Rhode Island Red, the Plymouth Rock and the Wyandotte breeds show a more rapid rate of feathering in females than in males. Not so many years ago the males of these breeds were likely to have bare backs until three or four months of age. Females, on the other hand, were reasonably well feathered at six or eight weeks. Through selective breeding especially of males that show complete back feathering at 6 or 8 weeks it is possible to establish this character in the flock. This rapid type of feathering in Rhode Island Reds has been shown to be recessive to slow feathering at the Massachusetts Station. By selective breeding using males that exhibit complete back feathering at eight weeks of age mated to females from families in which the greatest number of chicks are rapid feathering it has been possible to establish a rapid feathering line. In contrast, a line that is 100% slow feathering has been developed through the use of breeding males and females for families in which all the chicks lack feathering at eight weeks of age. In the Rhode Island Red it is very difficult to distinguish rapid feathering females from slow feathering females at eight weeks. The sex-linked gene for rapid feathering that is typical in the Leghorn need not be present in the Rhode Island Red or the Barred Plymouth Rock to produce back covering at eight weeks of age.

Studies so far made at the Massachusetts Station indicate that rapid and slow chick feathering are independent of the inherited characters affecting egg production.

Sweet Clover-Molasses Silage

Condensed from The Farmer

SILAGE made from a mixture of sweet clover and molasses proved equal in feeding value to corn silage in a feeding trial with dairy cows at the Northwest School and Station, at Crookston, Minnesota, last year.

The results were announced by O. M. Kiser, in charge of livestock at the Crookston station.

Sweet clover-molasses silage was made by adding 7 gallons (82 pounds) per ton to the green sweet clover as it was run through a silage cutter. The undiluted molasses was added just in front of the silage rollers. Six Holsteins were fed through four 28-day periods in making the comparison. In addition to the silage, cows were fed alfalfa hay and a grain mixture in proportion to their milk production. The milk and butterfat produced, the feed eaten, and the body weight of the cows were compared.

The sweet clover silage was equal in palatability to the corn silage. As a matter of fact the cows were fed more sweet clover silage to get the same amount of dry matter as they did in the corn silage. The average amount of sweet clover silage eaten was 33.4 pounds compared to 26.6 pounds of corn silage. The sweet clover silage formed 24% of the nutrients of the ration, whereas the corn silage made up 25% of the ration. The average daily milk production was 27.3 pounds for the sows when they were on sweet clover silage ration and 27.1 pounds when on the corn silage ration. The milk and butterfat produced and the body weight of the cows were practically the same on both rations.

The use of molasses in making sweet clover silage may increase the use of this crop on some farms. As a hay crop it has definite limitations on account of its coarseness, and because of the difficulty of proper curing. As a silage crop it does not contain enough sugar to make a satisfactory silage when used alone. The addition of molasses assures the proper fermentation. The addition of 75-85 pounds per ton costs in the neighborhood of $1.00. Any surplus of molasses beyond the amount required in the fermentation becomes a valuable addition to the feeding value of the silage. Other substances may eventually be used instead of molasses. Work along this line is now in progress at University Farm.

It remains to be determined whether sweet clover silage and

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sweet clover hay fed at the same time will make a satisfactory ration. Both of these crops when fed alone have produced sweet clover disease. Sweet clover-molasses silage has not been tested. Until this fact is estabilshed the sweet clover plant should not make up more than one-half of the roughage for dairy cows.

This method of preserving sweet clover will also give the silage an advantage of higher vitamin content and may also be a method of handling the crop that will prevent the loss of the nutrients in the leaves of the sweet clover plant. The sweet clover silage in the above mentioned feeding trial contained approximately 3.34% of digestible protein, whereas the corn silage had 1.54% of protein.

In case a large amount of this material is put in the silo, it is well to remember that this material may be higher in moisture and consequently heavier than corn silage, and if the silo is filled with this material the pressure on the silo might be greater than when corn is used. This is especially true in the upper half of the silo.

Wood Pulp—Southern Industry

Condensed from Agricultural Situation

Alan Macdonald

Forest Service

MORE than half of the increase in United States production of wood pulp during the last 30 years has been due to the development of the Southern wood pulp industry. Three decades ago there were few pulp mills in the South. The industry expanded as processes for manufacturing Southern pines into wood pulp were developed and it has more than doubled in the last five years as new low-cost production methods were put into use.

Fifty-one pulp mills, consuming approximately 14,000 cords of wood a day in a combined daily output of approximately 9,000 tons of dry pulp, are now operating in the South: Virginia, 10; Louisiana, 6; Alabama, 5; Florida, 5; North Carolina, 5; Tennessee, 4; Mississippi, 3; South Carolina, 3; Texas, 3; Arkansas, 2; Georgia, 2; Maryland, 2; West Virginia, 1. These mills as a rule make kraft paper and other types of paper products. A mill recently opened in Texas makes newsprint.

Southern mills produced nearly 2,800,000 tons of wood pulp in 1939. This figure compares with 1,308,000 tons in 1935, and with approximately 200,000 tons in 1910. The output in Southern mills last year constituted about 40 percent of the total United States production of 7,107,000 tons of wood pulp—the largest output on record. United States production has increased from 5,000,000 tons in 1935. This in turn compares with less than 2,500,000 tons in 1910.

Both the total United States production of wood pulp and the South's proportion of the whole are expected to increase as new low-cost pulp production methods are developed. Typical of the continuing progress in this technological field was the recent announcement that "the Forest Products Laboratory has made newsprint experimentally by mixing unbleached semi-chemical pulp from Southern gum trees with groundwood pulp from Southern pines."

Manufacturers of cellulose products also are looking toward Southern forests for supplies of raw materials. A recent news dispatch reported that a new rayon

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pulp mill is about to go into production in Florida. The South also is supplying increasing proportions of the Nation's lumber requirements, shipping large quantities to Central and North Atlantic as well as the Lake and Northeastern States.

Evidence has been accumulated by the United States Forest Service that with proper forest management the production of wood pulp may yield the South an increasing and continuing source of income. About one-third of the Nation's 630,000,000 acres of forest lands is in the "Deep South" including Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, and Texas. The trees grow quickly, the season is long, the forests are close to consuming markets.

"Proper forest management" includes adequate fire protection and usually some type of "selective" as opposed to "clear" cutting, or the taking of all marketable trees at a fell swoop. In the last three decades, 80 percent of the virgin timberlands of the South has been clear cut for sawlogs, poles and piling, and burned over. In spite of this fact, there are today extensive areas of second growth timber—not "full stocking" by any means, but the nucleus of fine future forests. If the same old clear cutting practices previously followed are now repeated with the new second growth that is marketable for pulpwood, there is real danger that some of the new mills may become in a few years "ghost mills" in the midst of denuded forest land.

Factors at present working toward such an unwanted outcome are: (1) The temptation of financially hardpressed farmers and other forest land owners to cash in on the upswing in demand by clear cutting; (2) the practice of many contractors for the mills of buying timber by the acre and then removing every marketable stick of whatever size. Contractors interested in getting the wood out as cheaply as possible usually are not concerned with the condition of the land or forest resource afterwards.

Federal and State foresters are informing farmers and land owners of the advantage of selective cutting—the selling of trees only as the trees attain a certain size, so that a continuing growth in the forest is assured and likewise a steady income for the owners. They are urging reforestation of cut-over areas. Some mill owners are joining in this work, using their own forest lands as demonstration areas. Better distribution of new mills with regard to the forest resources is also being advocated by many interested Southerners.

1,600 Nebraska Farmers Cooperate

Condensed from Extension Service Review

George S. Round

Extension Editor, Nebraska

THEY — meaning farmers, businessmen, and agricultural extension workers—started something in Nebraska five years ago. And it has not stopped yet but is gaining momentum as the years go by.

It is a State-wide agricultural educational program which has gained national attention as a means of co-ordinating the activities of all groups into one common purpose for the benefit of the State's basic industry—agriculture.

It is known as the Nebraska pasture-forage-livestock program. Everyone in the State knows it, of course, as the P—F—L plan; and the press, radio, and individuals call it that. Probably never before in the history of agricultural extension work within the Cornhusker State has a name and program caught the imagination of the public as much as this program.

The program was started in 1935. That was the year following the great drought of 1934 which seared pastures, caused livestock on farms and ranches to be sold, broke the hearts of farm and city people alike, and weakened the morale of the State's citizens. One problem was at the top of the pinnacle following that disastrous drought. What was to be done about the grass and pasture problem?

More than 50 percent of the State's acreage is devoted to grass and pasture; and when the drought literally wiped out a large percentage of this vast acreage, it was easy to tie all hands together in a common move to find out something about grasses and pastures which might help the situation.

Briefly, that is how the present P—F—L program originated in Nebraska. The co-operation given to it by all groups of citizens and the co-ordinated educational program in which practically all branches of the University of Nebraska College of Agriculture participate are basic reasons for the exceptional success of the program.

Out of it all evolved first what was known as the Nebraska pasture-improvement contest. Farmers were enrolled, and records were kept on their pasture management. County agents and specialists visited these people

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during the year, took a few notes on the farmer experiences, and collected some records. Then, at the end of the year a finish-up or recognition meeting was held in Omaha. There the farmers and businessmen got together and dissected the grass problem. They feasted at a banquet and heard farmers tell their own stories of successful pasture management.

Why in Omaha? Simply because one of the prime movers in the program was the agricultural committee of the chamber of commerce there. With them in sponsoring the movement were the Extension Service, the Nebraska Crop Growers' Association, and the Nebraska Livestock Breeders' Association. The latter two groups put up a little cash along with the Omaha Chamber of Commerce to finance the finish-up meeting and other incidental expenses.

For three years the pasture contest flourished. Farmer experiences were recorded. Farmers were honored. Largely, however, the program was one involving primarily the agronomy department of the College of Agriculture.

Then, in 1938, the need for broadening the educational movement was seen. There was a need for producing more drought-resistant feeds, such as the sorghums, and a necessity of balancing the livestock farming enterprises. Around a table gathered representatives of the Extension Service, the Omaha Chamber of Commerce, the crop growers, and the livestock breeders. Out of the huddle came the pasture-forage-livestock program with emphasis on flexibiilty each year.

Farmers were enrolled in the 1938 program. They filled out what were termed "balance sheets" in the spring to determine their feed needs for the year. They got a liberal education in livestock units and the amount of feed necessary to carry a "critter." So did the extension agents and specialists. On the basis of their "balance sheet" some 1,300 farmers planned their farming operations for 1938. They kept records during the summer and summarized them at the end of the year. Then they went to Omaha 600 strong from more than 60 counties for the finish-up meeting.

The attendance at the banquet, following the afternoon "clinic," in the chamber of commerce banquet room, was the largest there since Woodrow Wilson visited Omaha while he was President. It meant that the P—F—L program had finished up another year.

That brought around 1939, the fifth year of the educational program. More agencies and groups were brought into the picture. Director Brokaw pointed out early in the year the necessity of most departments on the campus co-

operating actively in the program. Federal agencies such as the AAA, SCS, and FSA gladly agreed to assist in any possible manner. District conferences in February brought out representatives of these agencies. From each of their clients came co-operators—or demonstrators—in the program.

Information about the P-F-L program was disseminated to all these Federal agencies. They knew at the outset that the theme of the 1939 program was a balance between livestock and feed on farms in Nebraska. They knew, too—as did farmers—that the slogan of "grow into livestock; don't buy into livestock" has something of definite value. The year's review of the markets bore out the soundness of the program.

But State and Federal agencies were not the only ones co-operating. Bankers joined in evening conferences over the State in February to discuss the program and more particularly the livestock-financing picture. Everyone was agreed then that "growing into livestock" was more sound than sudden speculating on large numbers of stock. A total of 1,600 farmers enrolled as co-operators.

Civic groups caught the spirit of co-operation also. Regional finish-up meetings were scheduled at four out-of-State points. Farmers were brought together for a full day's program. There farmers told their own stories, college of agriculture specialists told their stories, and outstanding co-operators were honored.

No wonder then that the finish-up meeting of the State program in Omaha on November 28 of last year was a huge success. Representatives from 63 of Nebraska's 93 counties attended. They looked over a livestock-marketing demonstration at South Omaha in the morning, listened to "clinic" speakers in the afternoon, and 800 of them jammed the chamber of commerce dining room for the honoring ceremonies during the evening.

Among the features of the finish-up meeting was the showing of 1,400 feet of colored motion pictures depicting the eight points under the program itself. These pictures had been taken throughout Nebraska during the spring, summer, and fall months by Director Brokaw and were shown by him at the clinic.

But previous to the Omaha gathering, many counties held P-F-L recognition meetings and banquets. Civic groups co-operated.

Not all activity, however, was confined to the enrollment of co-operators and the collection of farmer experiences. Related projects were listed under P-F-L and carried on in that manner throughout the year. These projects included district sorghum

days which attracted 1,500 people at one meeting, the instigation of an annual sorghum-topping contest with 6,000 people on hand, conducting sorghum tests, feeding trials, and many other activities.

Thus again the P-F-L program was brought before the people by all means available. And thus ended another year of a co-ordinated educational plan which goes into its sixth year in 1940.

Greenbacks from Green Pastures

Condensed from Turkey World

E. Y. Smith
Cornell University

THE idea of considering the turkey range from the standpoint of feeding economy is not a new thing. Turkeys have ranged and have obtained more or less of their feed from the range since before domestication. But, like so many common things, it has been taken so casually that it has come to mean many different things to many different persons.

To many people, the range is merely an exercising lot, and a means of lessening the dangers from parasites and disease, but to others, it is also a means of a better quality production at a lower feed cost.

During the past few years, we have seen a renewed interest in both turkey and poultry ranges. Many hard-headed business men, who produce poultry and turkeys on a commercial basis, and for their main source of income, are using these pastures with good results.

There are many differences in opinion among our farmers who have made a consistent use of pastures as to what type of pasture is best. One uses soybeans and believes that it is the answer to the pasture problem; another has used rape during the past few years and is 100 percent satisfied with it; another uses alfalfa, in order that it may be cut for hay during two years of the three-year rotation, when the turkeys are ranged elsewhere; and still others are happy from the results from a seeding of 6 lbs. bluegrass, 6 lbs. rough-stalked meadow grass, 6 lbs. perennial ryegrass, and 2 lbs. ladino white clover. Very recently, we have

Reprinted by permission from the Turkey World, Mt. Morris, Ill., April, 1940

had some very excellent reports from clear seedings of ladino clover.

There is probably no one *best* seeding under all conditions. In last analysis, each grower must use the range crop that will give best results under his conditions of climate, soil and other environmental factors. One fact, however, is universal, that regardless of the kind of crop grown, practically all green forage crops will pay a profit, if correctly used.

More mistakes are made in the care and management of permanent pastures than in getting them started. For example, some pastures are overstocked, with the result that the seeding is killed and the soil made bare. In some instances, a pasture may be understocked and not clipped frequently; hence, the grass matures, becomes tough, unpalatable, indigestible and, consequently, its function as a pasture is of little importance. The third mistake commonly made is leaving the feeders and fountains in one place, or moving them too infrequently. When this is done, the birds range near the hoppers, kill the forage around the hoppers and permit it to mature and become useless as a source of feed over the other parts of the field.

The best results have been obtained when the correct number of birds have been placed on the range. This number may be anywhere from 100 to 200 birds per acre, depending upon the type of seeding, fertility of the soil, care of the pasture, and the weather conditions. The hoppers and fountains should be moved as frequently as needed—often once a day. By this means, the poults cover more of the land, keeping the forage low without killing it out in spots. This practice increases the total production per acre. It also produces a continuous source of young green forage, which is higher in protein and total digestible nutrients, in addition to the increased palatability. Frequent moving results in better distribution of manure which will serve the dual purpose of better fertilization of the soil and scattering of disease producing organisms. Some growers find that by keeping their turkeys on the move that they can come back to the same range the following year without much danger of disease, due to the fact that so little contamination resulted from previous use. Turkeys are great consumers of young grass, but do not utilize hay or mature grasses to an advantage.

Crops frequently clipped at Cornell have been made to yield from two to three tons of dry matter per acre of pasture that has contained approximately 30 percent of protein. Dried skim milk contains only approximately 34 percent protein. Young green forage (not over 4 in. in height)

contains as much protein pound for pound as liquid skim milk.

Careful planning will make it possible for most growers to have grass available during the entire year. Good alfalfa sod or other sods will usually accomplish this, but growers who must depend upon annual crops will find a fertile field of possibilities.

Rape, perhaps, provides the greatest quantity of succulent green feed in the shortest period of time. The soil should be prepared as for corn. Dwarf Essex rape usually gives best results and should be sown at the rate of 5 to 8 pounds per acre. Sow a little oats with it as the oats will provide additional green feed. Rape requires plenty of moisture and may not provide green feed throughout the hot late summer months.

Soybeans represent the favorite range crop for many growers. The beans should be drilled and allowed to reach a stage of heavy foliage. If planted in this manner, instead of in rows, the turkeys will not trample them down, but will eat the vines completely as they go.

Sudan grass is popular in some sections. This crop stands drought well. It is usually planted about 10 days after the usual date of planting corn. About 15 lbs. per acre is the usual seeding rate. If the first growth becomes too rank, it can be cut for hay. The resulting second growth will be green and tender when needed.

Other grasses such as oats, wheat, barley, rye, corn and the sorghums are often thickly planted for pasture.

Some growers sow rye in early fall, in order to have green feed available when practically all other greens are frozen and have ceased growth. Rye will also provide the best source of early spring greens in most sections of the country.

Poultrymen in this state have claimed a saving in the feed cost of raising pullets of from 20 percent to 25 percent. Turkey men have estimated savings that range from 25 percent to 40 percent in the feed cost of producing turkeys. Data from the Kansas Experiment Station indicate a saving of about 35 percent in the feed cost of producing turkeys.

Success on the Fruit Farm Does It Lie in Diversification?

Condensed from American Fruit Grower

Jonas Howard

THAT diversification on fruit farms is practicable and profitable is shown by dozens of successful multiple-fruit enterprises in various sections of the country. The reasons for success where labor, materials and supervision costs are spread over more than one crop and where returns cover more than one part of the season, are all tied up in the one fact that an entire year's operations are not centered on one crop which, with adverse weather, pest or market conditions, may prove to be only a "break-even" proposition.

In a Michigan county known far and wide as an ideal fruit section, most growers produce apples and peaches, many just one of these two fruits. Yet the one grower in this section who stands at the head of the list on gross income from his farm, which in size averages with those of his neighbors, has built his year-after-year successes, both in quality of fruit and money received for it, on not one, not two, not even three, but on eight different kinds of fruit. Some may say that this is a good many different types of fruit to care for. Perhaps it is too many, to begin a program of diversification, but this grower probably has added to the variety of fruits over a period of years until today he doesn't have to worry about a crop failure for any one fruit—the others will carry him, and past performances indicate that they will carry him well through the season.

While the ideal time to start diversification is when the fruit farm is being planned so that subsequent planting care and final marketing of the fruit can follow a definite pattern, there is no reason why diversification cannot become a part of the already established fruit farm. Of course, there are situations where diversification is unnecessary, but by and large a shift is being made and present action indicates that there will be more and more shifting to more than one fruit on many farms.

Take, for instance, the case of Virginia growers. They, like others in different parts of the country, are facing a ticklish situation on early apples. For the

Reprinted by permission from the American Fruit Grower, March, 1940

past couple of years they have made no profit on Duchess or Transparent and have decided that care of trees and cost of marketing the fruit amount to wasted time, effort and expense. In their case, removal of the early apple trees means that land will be available for other crops. It's only logical that they will turn to a profit-producing fruit crop since they are acquainted with fruit management and have equipment for pest control and culture. What these fruits will be, however, is a problem that makes fruit specialists scratch their heads. They agree that bramble and bush fruits, strawberries and perhaps one or two of the stone fruits seem the logical types to substitute for outmoded kinds that have lost market favor or that are glutting markets and thus lowering prices.

There are several outstanding examples of growers who have worked into small-fruits along with tree fruit operations.

Into the diversification picture there is liable to come the situation that a grower, excited over the possibilities of more than one or two sources of cash income, gives all of his attention to the new fruits. When this happens, other production suffers. Care must be taken that diversification comes as a well-planned change rather than merely an overnight shift from one crop to another which will leave the too eager grower right at the starting point —with just one crop and one source of income.

In deciding upon a diversification program, it is important that the program be kept flexible enough so that changes can be made according to needs that are likely to take place. A fruit that today is moving at top speed and top prices on the nation's markets, in ten years may be overshadowed by another, superior variety of the same fruit or by an entirely different fruit type. Such a possibility demands constant study of the better variety and new fruit introductions and provision for necessary changes in plantings.

Although the kinds of fruit with which growers usually diversify are many, in most instances the newly planted stock is of the smaller fruit kinds so that necessary changes in production can be made over a two to three-year period instead of the dozen or more years required to realize a return from tree fruits.

As suggested above, diversifying any fruit farm rests with the management program being followed for that farm. It is obvious that where present fruits are being appropriately received on markets and the outlook for them looks bright, there is no reason for the grower to burden himself and his workers with other fruits. But for a grower who has been forced to buck glutted mar-

kets with fruit into which he has put a whole year's work, and then to realize production cost only, this matter of getting into the growing of other fruits offers real hope in the challenge it brings to make best use of his knowledge, his work, his land and his equipment.

The Importance of Good Quality Hay

Condensed from Pacific Rural Press

DAIRYMEN who hope to get maximum production from their herds should secure the best quality of hay possible. If the dairyman raises his own hay, the type of hay to be fed may have been determined by the haymaking season. In this case, there is little he can do except feed the hay properly and supplement it with a properly balanced ration. The type of grain will vary a great deal, depending on the kind and quality of hay being fed.

The dairyman who must purchase hay should give careful consideration to the quality. Much of the hay sold on the market is expensive at any price. When purchasing hay, it is important to give consideration to the following factors:

Leafiness: In legume hay, particularly alfalfa and clover, the leaves contain most of the food value. Best quality hay may contain as much as one-half leaves; whereas, hay that was improperly made may only contain 10 per cent of leaves. The difference in feeding value between this type of hay is much greater than the difference in price on the market.

Coarseness of Stems: Hays that were cut when they were too mature contain coarse, woody stems that are not palatable or digestible. This type of hay has a low feeding value. Many times dairymen complain about the hay they are feeding, and upon examination it will be found to be coarse-stemmed hay that has little feeding value. Cows will not consume this coarse matter economically. Fine, soft stems in hay are palatable and contain much food value. Best quality hay has soft stems so that when it is twisted between the hands, it will shatter or break.

Stage of Maturity When Cut: Late cutting in legume hay usually results in low protein, less leaves, and poor quality in general. Alfalfa hay that is more than 25 per cent in bloom does not make the best hay. Grains that are cut after they have reached the bloom stage are much lower in protein than they would be if cut earlier. When examining hay to be purchased, it is

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important to estimate the stage of maturity at which it was cut. In alfalfa, it is possible to determine the size of head or seed formation.

Foreign Matter: Foreign matter in hay may be detrimental; however, this will depend on the kind of matter present. Legume hay that contains early cut grass may have a very high feeding value; whereas, if the foreign matter is made up of weeds, it may detract very materially from the feeding value of the hay. In purchasing hay, it is well to determine the amount of foreign matter present, and especially if it is weeds. Weeds from hay may be a source of infestation on the farm later on.

Color: One of the important indexes of good quality hay is the color. Hay that is bleached out, either through exposure to the sun or stack burning, does not contain as much food value as bright green hay. The green coloring matter of the hay contains the carotene, or vitamin A. The amount of color is a good index of the amount of this vitamin present. Cows that are fed on low quality hay that has been partly bleached out may actually be undernourished in the spring. These low quality hays may cause breeding trouble and possibly dead calves in extreme cases.

Dairymen purchasing hay can safeguard themselves by buying hay that is graded according to the United States government standards. These standards are set up by the Bureau of Agricultural Economics, and the men who do the grading are trained to determine the percentage of leafiness, color, foreign matter, and coarseness of stems. Anyone who purchases on a government grade basis may be assured that the hay purchased will be of the quality designated. Buyers must keep in mind that such labels as "extra fancy" or "No. 1" hay mean nothing unless they are prefixed by the United States grade. For example, United States No. 1 alfalfa must contain at least 40 per cent of leaves, 60 per cent color, and not over five per cent foreign matter. This is a definite standard, and the purchaser can be assured that he is getting this quality when he buys on this grade basis. United States No. 2 alfalfa must contain 25 per cent or more of leaves, 35 per cent or more of color, and not over 10 per cent of foreign matter. According to this grade, there will be considerable difference in the quality of United States No. 2 alfalfa.

When purchasing hay, it is of utmost importance to make sure it is high quality. Dairy cows will not produce milk when they are fed on low quality hay.

Grain Bin Robbers

Condensed from Kansas Farmer

W. J. Daly

WAITING only for the first warm days of spring are the millions of stored grain insects that did so much harm on Kansas farms, in grain warehouses, and elevators last year. They are the survivors of what George A. Dean, head of the Department of Entomology at Kansas State College, described as the worst Kansas infestation of stored grain insects in the last 10 years. Farmers are warned to be on the watch for these pests, and to be ready to apply control measures, as soon as the first balmy days of spring warm the stored grain to 70 degrees F. While they have hibernated all winter, these insects have been injured but little, and now with the arrival of spring they are active again.

All these pests, including the old familiar grain weevils and moths, the cadelle, and the lesser grain borers, the latter being newcomers to Kansas farm bins last season, must have temperatures above 65 degrees before they become active. In fact, they will not do much until it has warmed up to 75 degrees. Of course, it is the temperature of the grain, and not the climate outside, that determines stored grain insect activity.

Mr. Dean believes the heavy infestation of 1939 was due to wet weather at harvest, especially in South Central and Southeastern Kansas. This raised the moisture content of the stored grain and made conditions ideal for such insects. In fact, these insects that feed on stored grain do not thrive or increase much if the grain is too dry. Entomologists say it was the extreme dry condition of the grain, during most of the years from 1933 thru 1938, that made such pests so scarce during that period.

Farmers and grain dealers all agree with the entomologists that last year was a record breaker in the number of stored grain insects.

It is estimated by the U. S. Department of Agriculture that the losses caused by stored grain insects amount to 250 million dollars annually for the United States.

In October, last fall, out of 709 cars of wheat received in Kansas City, Kan., 219 were graded weevily. In November 206 graded weevily out of 632 cars, in December 91 out of 562, in January

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11 out of 344, and in February 14 out of 606. Out of a total of 2,853 cars of wheat, 541 graded weevily.

The lesser grain borers, new as stored grain pests in Kansas and doing serious damage last year, are now ready to continue destruction as soon as warm weather arrives. They came to America in wheat shipments from Australia during the World War. The cadelle, which previous to 1939 had confined its depredations largely to mills, grain warehouses, and elevators, did much damage in farm bins in 1939. It is of especial interest, for it has the vicious habit of boring into the timbers and boards of infested bins. Boards completely honeycombed by this pest have been sent to Kansas State College recently from one county.

Protected from ordinary clean-up methods by the galleries and tunnels it has made, the cadelle will live for a long time. The adults, which are black in color and about ⅓ inch long, can survive for two years, and including the life of the larva and pupa their life cycle can be stretched to three years. During its life the female cadelle lays from 800 to 1,000 eggs, so reproduction is rapid. As long as they are alive these insects can, in a surprisingly short time, infest any grain put in the bin.

Fortunately, all the stored grain insects, including the wood boring cadelle and the Angoumois grain moth, can be destroyed by the use of carbon disulfide. To be effective, it must be used when the temperature of the grain is above 70 degrees. Bins must be made as airtight as possible, for it is the vapor from the evaporating liquid that kills and this must not be diluted to any extent with air. As this vapor is heavier than air, the liquid should be placed in shallow pans on top of the grain, or poured on burlap sacks partly buried in the top of the grain. One pound of carbon disulfide should be used for each 25 bushels of grain.

The bin should be allowed to fumigate for at least 36 hours, and if the grain is not intended for seed, 48 hours is better. The bins and building must be thoroughly aired out before entering. It is also well to remember that both the vapor and carbon disulfide liquid are highly inflammable. All fire must be kept away.

Summing up this discussion of the stored grain insects, we must conclude that there is a prospect of a heavy infestation of such pests in 1940. Their abundance in 1939 puts them in a position to again do much damage this year, especially if damp weather conditions should prevail during harvest.

Fortunately, every farmer can control these pests on his own farm. First and most important,

all bins should be thoroughly cleaned out before warm weather arrives. Waste grain cleaned from the bins should be fed at once or burned. If the bin was badly infested last year or if the cadelle has done any boring in the floor and sides of the bin, it must be fumigated with carbon disulfide. Five pounds of this liquid will fumigate 1,000 cubic feet of empty bin space. The cadelle does most of its work in the floor and lower sides of the bin, so fumigation in the lower part is especially important.

Prompt threshing of stacked grain will also aid in control, for the rice weevil and Angoumois grain moths go to the fields and lay eggs on the ripened grain. In this way grain may become thoroughly infested before it reaches the bin. Anything the farmer can do to keep his grain dry is also a big help in insect control, for these pests cannot increase rapidly or normally pass through their life cycle without some moisture.

The man who takes all these precautions, and they are simple and not expensive, should suffer no loss from the stored grain insects.

Oats

Fulton, a new variety distributed to Kansas farmers for the first time last year, has demonstrated two outstandingly desirable characteristics: resistance to smut, and the ability to produce a good crop when planted late. In co-operative oat-variety tests throughout the state, when planted at the same time as Kanota, Fulton yielded practically the same; but when planted late in the season, it outyielded Kanota by as much as 20 to 25 bushels to the acre.

On state agricultural experiment station plots at Columbus, Ohio, the yield of oats has decreased from 1 to 1½ bushels for each day's delay in planting after early April.—*G. F., Ohio.*

—*Successful Farming*

Pickling Cucumbers

Condensed from Southern Agriculturist

I. O. Schaub
Acting Director, N. C. Agricultural Experiment Station
and
Dr. Henry G. Knight
Chief, U. S. Bureau of Chemistry and Soils

"CAN'T produce cucumber pickles in the South. The weather's too hot." That's what we were told a few years ago. But we are producing them today—good ones, too—thanks to the results of co-operative research, and to the determination of progressive leadership.

It takes about five and a half million bushels of cucumber pickles to satisfy the yearly pickle appetite in this country. This production calls for the use of about 100,000 acres of land. The average yield is around 50 bushels of cucumbers per acre, and the total cost of enjoying this spicy delicacy amounts to more than $30,000,000 a year. Until a few years ago, practically all the pickling cucumbers were produced around the Great Lakes because it was thought that this was the ideal cucumber-producing region due to the hot humid days and cool nights.

But that's not the opinion today in North Carolina where a scientific study of this problem is being made. A few years ago the North Carolina Agricultural College, in co-operation with the United States Department of Agriculture, set out to find through scientific research why cucumber pickles could not be manufactured as successfully in the South as in the important pickle-producing states in the North and West. This study called for specialists in plant industry to work out varieties of pickling cucumbers suited to Southern conditions. It required chemists and biologists to work on the "softening" problem and other troubles that developed when Southern-grown cucumbers were placed in the brine and pickling vats. It called for field and laboratory research on everything that was in the way of producing high grade cucumber pickles. Congressman Barden, whose home is in the cucumber district of eastern North Carolina, secured a $10,000 appropriation for this research which is now proving by farm and factory demon-

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strations that it is both practicable and profitable to produce pickling cucumbers in the South.

Ten years ago North Carolina was producing, as it is today, a great many cucumbers for shipment to the fresh produce markets. A few venturous packers tried pickling on a small scale. They met with some difficulties, but kept trying in the belief that experience and scientific research could solve most of the problems. That's when the State College and the Department entered the picture. And now as a result of experience by the packers and of the co-operative scientific investigations directed by M. E. Gardner, in charge of horticultural work at the College, and Dr. Harry E. Goresline, microbiologist of the Bureau of Chemistry and Soils, some of the problems have already been solved, others are being investigated, and the whole work is expanding with an increasing number of farmers producing cucumbers, and more than a half dozen plants packing pickles.

A plant at New Bern, North Carolina, has been pickling cucumbers on a small commercial scale for a number of years. Production has practically doubled in the last two years. This year the New Bern plant drew cucumbers from 800 acres on contract, and something like 200 acres from volunteer producers. It started about 14 years ago with 30 brine or pickling vats. This year it has 90 vats at New Bern with a capacity of 80,000 bushels of cucumbers and all vats filled. In addition to this it has a salting station at Burgaw that can handle 30,000 bushels, which gives this plant a total vat capacity of 110,000 bushels. Yields around New Bern run from 100 to 125 bushels per acre.

Mount Olive, North Carolina, has one of the most up-to-date pickle plants in the South, with a vat capacity of approximately 100,000 bushels drawn from about 1,000 acres. A number of new vats had to be built during the 1938 filling season to take care of all the cucumbers that were delivered. A pickle company of Baltimore has three large salting stations in North Carolina. This company contracts considerably over 1,000 acres of cucumbers.

The largest cucumber pickling plant in North Carolina is at Faison. This plant opened in 1929, and like the other plants has greatly increased its production in the last few years. The vat capacity of the Faison plant is 150,000 bushels, and all filled last year. The yield of cucumbers in the Faison district runs about 90 to 100 bushels per acre, and the plant had about 800 acres under contract in 1938. This plant is putting up, in addition to regular cucumber pickels, a spe-

cial fresh sliced cucumber that is selling well.

It is at Faison that the North Carolina State College and the Bureau of Chemistry and Soils have their model experimental pickle plant. It has a complete laboratory equipped to handle both chemical and bacteriological problems. It has 14 experimental salting vats with a total capacity of 1,200 bushels of cucumbers, and all vats have been filled under special care for experimental purposes to help solve the cucumber and pickling problems in the South. It was to this experimental plant that commercial pickle experts were invited last spring to examine the stock that was salted the previous season. This enabled them to gather first-hand information on pickling cucumbers in the South under scientific conditions and to see how research had helped their industry. For example, it was originally thought that cucumbers had to be salted very heavily under Southern conditions to prevent spoilage. Research has shown that this is not the case if the proper precautions are taken. Research has helped this work so much that two men attached to the N. C. Agricultural Experiment Station, Dr. Ivan D. Jones and Dr. Otto Veerhoff, and two in the Bureau of Chemistry and Soils, Dr. M. K. Veldhuis and Mr. J. L. Etchells, are now giving their full time to scientific research in this rapidly expanding farm enterprise.

Now for the farmer's side. One reason the cucumber pickle business is looking toward the South is on account of increased yield. In the main cucumber belt the average yield runs from 50 to 60 bushels per acre, while in the sections of North Carolina where better methods are being followed, the average is from 90 to 125 bushels per acre. Due to better yields and to the fact that scientific research is succeeding in solving some of the problems that previously scared producers and packers away, North Carolina is now fifth in the production of cucumber pickles compared to a listing in "all other states" a few years ago. Production is also increasing in Virginia, Texas, and many other Southern states.

From a farm standpoint the production of pickling cucumbers is not very different from the production of this crop for the fresh produce market. The cost of producing an acre of pickling cucumbers in North Carolina runs between $40 and $50 including labor, rent, fertilizer, and so on. It requires from 800 to 1,000 pounds of fertilizer to produce an acre of pickling cucumbers compared with 1,200 to 1,500 pounds for an acre of fresh produce cucumbers. The popular mixtures used have plant food ratios of 4-8-4 and 5-7-5. Planting in North Carolina occurs

around the middle of April and harvesting begins about the middle of June and usually lasts for about four weeks.

The production of cucumbers for pickling purposes has not reached the large commercial farm scale in North Carolina and other Southern states that it has in the Northern cucumber belt. Thus far it is purely a side-line crop with yields not as high in many instances as they might be. The approximately 10,000 acres of pickling and fresh produce cucumbers produced last year in North Carolina were grown on thousands of farms. Some farmers grew only a quarter acre while others had as high as 10 or 15 acres. The "cukes," as they are called, are pickled every other day, and an easy method of marketing is to hitch a light, two-wheel trailer to the family automobile, and deliver the 15 to 20 bushels of cucumbers to the pickling plant. Farmers are usually paid once a week for their cukes, and the $40 or $50 net often derived from the production of an acre of cucumbers not only comes during the mid-summer season when cash is scarce on the average farm, but it is also another source of cash income to aid in diversified farming.

Cucumber

A new bush or dwarf cucumber, called Midget, has just been introduced by the Minnesota Experiment Station. Picking is easy, since there are no spreading vines. The compact plants, growing from 6 to 12 inches tall, have few short side branches. The small, smooth fruit is especially good for pickling. Individual plants do not bear heavily, but they can be grown close together so that acre yields compare favorably with pickling varieties. Young fruit is green in color, with light stripes.—*W. J. H., Minn.*

—*Successful Farming*

How Sanitation May Prevent Livestock Diseases

From the Book Livestock and Poultry Diseases

W. A. Billings, D.V.M.

SANITATION might be divided into two kinds, general and specific. By general sanitation is meant the attempt to keep the feed, water, air, barns, yards and soil as clean as possible. This might be called shotgun sanitation, because it is not directly against any special disease. It will, at least, promote better living conditions. It will not control a contagious disease, however, because certain important avenues for the germs to enter may be over-looked, unless the nature of the disease is known and how it is spread. This would permit the disease to continue. To illustrate, tick fever is a common disease in the southern states. It affects cattle and is transmitted by the bite of a tick. One might scrub the barn, disinfect the feeding and drinking utensils, and sprinkle lime on the soil of the barn yard, but this would not help. The problem is to get rid of the ticks. This is done by dipping all cattle in the tick-infected territory. General sanitation will not control tuberculosis; all the animals responsible for spreading the germs must be removed from the herd. General sanitation is good; it increases one's self-respect and makes the premises look better and more attractive. One should never try to disinfect the hog lot, cow lot, or chicken yard by sprinkling lime or other chemicals on the soil; it is a pure waste of time. Nature and sunshine will do a much better job. Instead, one should move off the old yard to a new one and give nature a chance to clean up.

Specific sanitation is the important method of combating disease. One should first determine the nature of the disease, learn the cause, find out how it is spread, learn how the germs enter the healthy animal's body, and then, armed with this information, set out to block the way and prevent further losses. In order to control and stamp out an outbreak of tuberculosis in cattle, one must know that the germs of the disease enter the body of the healthy animal through the mouth by means of food and water. Cows often have

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the lung form of tuberculosis. This makes it very easy for the germs to pass out through the mouth when the animal coughs and thus serves to infect the feeding floor and the water supply. To counteract this, special care should be taken to keep the drinking utensils or cups and the feeding floor clean. This is much more important than a coat of whitewash on the walls.

The present method of hog cholera control places the entire effort on prevention. There is no positive cure for the disease after the animal becomes infected. The use of anti-hog-cholera serum and virus as a vaccine for healthy pigs will make them immune for life. This is just ordinary hog life insurance against cholera. General sanitary methods may be necessary but will not prevent this disease.

To emphasize again the need for more knowledge of diseases and the proper methods of control, swine tuberculosis may be considered. This disease has been spreading in an underhand way for many years. Until recently, everyone thought hogs received all their infection from cows, by associating with them or by drinking raw milk from infected cows with diseased udders. Much of this is true but more is now known. Recent experiments have shown definitely that the larger part of swine tuberculosis comes from association with the farm flock of chickens, which is infected with tuberculosis. To profit by this knowledge, the disease must be cleaned up in both cattle and chickens, or the pigs must be kept away from the sources of infection. This is another case in which general methods of common cleanliness would have failed.

Again, most classes of livestock suffer from parasites. A sheep suffers from a disease commonly called grub in the head. In some sections of the United States it is very troublesome. The story goes something like this. During July and August a fly alights on the sheep's nostrils and deposits an egg or tiny grub. The grub, in turn, crawls up inside of the nose and picks out a comfortable resting place. As it crawls, it irritates the animal and causes it to act as though it had a cold in the head. The point to bring home is that here, too, a little more information will do more than a cure. There is no easy help for a sheep badly affected, but if a bit of pine tar is smeared on the animal's nostrils during the months of infections, the fly will still be around, but it does not care for the odor of tar and consequently does not get a chance to deposit the larvae on the sheep's nostrils.

It is hoped that one fact has been made clear: one must do more than clean up and keep clean. A general house-cleaning is very well as far as it goes, but

it does not go far enough. To control successfully any livestock disease one must first know what the disease is and how it is transmitted. Only by directing sanitary efforts against it can one hope to accomplish anything. One should not worry about cures for most of the diseases of livestock. All sanitary practices aim to stop the spread of disease. Farmers waste entirely too much time and energy looking for cures for this, that, and the other difficulty that may be bothering their animals. This constant chase for cures has made them easy prey for the peddler of all sorts of ridiculous concoctions that are designed to meet the demand. The hog-grower wastes thousands of dollars in search for the perfect hog tonic. So far as known it has never been discovered and is not likely to be.

While one may agree that all this is true, it is well to peep behind the scenes and learn what actually takes place on many farms. A horse in the barn is suffering from colic. Instead of calling a competent veterinarian, it is often customary to have on hand a bottle of colic medicine. The owner does not know that colic is merely a pain in the region of the abdomen. This pain may be due to one of several causes. The animal's intestines may have become twisted while rolling on the ground. This is an extremely painful disease and does not call for colic medicine. In fact, that would only serve to increase the pain and discomfort. A colic or the pains of colic are nothing more than the symptoms of a number of troubles that might be easily misconstrued. It might even be a gas colic. This condition prevails in man as well as in animals. Anyone who has suffered gas pains after an abdominal operation will understand what is meant. Most colic medicines are simple active cathartics and may actually kill an animal if used improperly. A sick horse in the throes of a severe colic requires expert help and not a shot-gun prescription.

For many years the grower of swine has felt the urge to feed promiscuous tonics and conditioners. This is thought to be necessary if one intends to obtain quick and profitable gains. Thousands of dollars are wasted annually that might be well spent for other things. Hogs suffer chiefly from hog cholera, necro and worms. The standard tonic is worse than useless to cure or control any of these. In fact, they actually do positive damage, because they give the owner a false sense of security and delay the time for carrying out simple and practical methods of control. Farmers who depend on the itinerant peddler for veterinary advice are bound to pay heavily for it.

Hardly a year passes that some new panacea is not brought out

for the prevention of hog cholera and other swine diseases. It is the writer's opinion that good hogs can be raised on clean ground, free from worms and necro, without the aid of panaceas and tonics. One might continue indefinitely a recital of such practices. It suffices to say that it is simply going at the trouble blindfolded and no relief can be expected. How much better it would be to adopt such reasonable practices as those mentioned a few pages back. Then, also, the local veterinarian is there to help and should be employed whenever necessary. No matter how expert and efficient he may be, he cannot cure pigs dying of cholera. He has no medicine that will prevent tuberculosis in livestock. He can help many times to locate the cause of the trouble and then advise a sane and sensible plan of control. This is a new day of efficiency on the farm. This tonic era is a thing of the past, or should be.

The above is an excerpt from LIVESTOCK AND POULTRY DISEASES by W. A. Billings, Assistant Professor of Veterinary Medicine, University of Minnesota, which we recommend as an excellent book for use by the stockman. It is up to date, emphasizes the importance of securing a competent veterinarian when needed, but helps the stockman to prevent, or treat those ailments which he can undertake. The book is divided into five parts, each devoted to the health of one class of animals: cattle, horses, sheep, swine, and poultry. It is published by the Macmillan Co. and for the convenience of our readers may be purchased through the Farmers Digest ($3.50).

Tennessee Walking Horse

Condensed from American Hereford Journal

John Lorenz
Jackson, Miss.

THE Tennessee (or Plantation) walking horse, a superior saddle animal which is regarded today by many as "the world's greatest pleasure horse," was no mere accident. It is the product of a century of judicious breeding which has resulted in a marked degree of intelligence, a docile disposition, three free and easy gaits, and large general utilitarian purposes.

The origin of the Tennessee, or Plantation, walking horse, of course, dates back to antiquity, and this breed of horse of the present day still possesses a remote trace of Arab and Barb. But in their veins now is a confluence of the blood of the Thoroughbreds, Copper Bottoms, Travelers, Hals, Grey Johns, Brooks-Whips, Donalds, Pilots, Mountain Slashers, Denmarks, and a distinct cross of the Morgans.

Into the crucible of time these strains have sifted and the outstanding individuals of today have resulted from the matings which represent the best blood known to horse lore.

Today the Tennessee, or Plantation, walking horse stands without a peer in the field of general all-around service, and particularly all-around pleasure. The Stud Book of the Tennessee Walking Horse Association shows Old Black Allen F-1 as the most prominent sire and father of the Allen strain, and his two best-known sons, Hunter's Allen F-10 and Roan Allen F-38, to have been the sires of a large percentage of our present-day walking horses.

Many people are not familiar with the true gaits of the walking horse, frequently confusing them with fox trotting, or an amble or stepping pace. The true walking horse must stay on four corners and not on two sides as the horse that does an amble or stepping pace. The running walk is a modified form of the square or true trot. A walking horse which is a natural nodder is born thus but can never be man-made, while any fairly skillful trainer can make or develop an ordinary horse into a fox trotter, or train it to do the stepping pace.

The running walker with his peculiar habit of nodding his head

Reprinted by permission from the American Hereford Journal, March, 1940

with every stride brings each front foot in contact with the ground a mere instant before he does the diagonal opposite hind foot, while the fox trotter does just the opposite or reverse—brings each rear foot to the ground an instant before it does the diagonal front foot. This difference between a running walker and a fox trotter reveals why a running walker cannot be man-made and a fox trotter can.

The walking horse has three gaits—the flat-foot walk, the running walk, and the canter.

The flat-foot walk is square on four corners, bold, but with ease and grace.

The running walk, from which it gets its name, is its most popular and leading gait and is amazingly easy and delightful to the rider. It being a natural gait to the horse, it permits him to carry the rider with ease at a rate of from eight to ten miles an hour. It is a four-cornered gait and is started like the flat-foot walk, but as speed is increased the horse over-steps the back foot over the front track by from a few to eighteen inches. It takes the jar or jolt from its back by the spring of its limbs, the motion of its feet (which is peculiar to the walking horse) and the nod of its head. All walking horses will relax certain muscles while walking their best, nod their heads, swing their ears, and even snap their teeth.

The canter the walking horse gives the rider is easy, with lots of spring and rhythm, and with just enough rise and fall to give one a thrill.

The saddle gaits, properly speaking (those mentioned above), are natural to well-bred walking horses, and it is a common thing to see a foal, while following its dam in the pasture, exhibit all the gaits of a trained walking horse. To improve and separate these gaits, rendering the young animal steady, and to teach it to change from one to the other at the will of the rider, is the sole task which the trainer finds before him.

The ideal walking horse today is one which stands 15½ hands high; weighs around 1,110 pounds; has a long neck, well set ears; bright eyes in a straight, thin head; short back, round barrel ribbed to hip over a long belly and with plenty of foot and bone to carry its weight. It should be naturally a high tail horse.

These horses are of many colors, mostly sorrel, black, roan, some pure white, and a few yellow with white mane and tail.

Smoke Flavored Turkey

Condensed from New England Poultryman

S. M. Costigan

Research Department, General Laboratories Div.—Pennsylvania Salt Mfg. Co.

SMOKE flavoring poultry is a new way of preparing chickens and turkeys which adds a zest and tang to the meat. The smoke flavor which fowl take up when properly treated is delicate and very appetizing. Those who have had the privilege of trying this delicacy have pronounced it excellent, and the great majority consider it to be a desirable addition to the many ways in which poultry meat can be served. The process by which smoke flavored meat is produced is a simple one and easy to carry out.

Smoke turkey has been considered a delicacy which demanded a very high price and, consequently, was not served frequently. The high price of smoked turkey can be demanded for two reasons: (1) the methods of preparation have been and still are surrounded by a great deal of secrecy and mystery and (2) as these methods necessitate the use of a smoke house, they involve costly and time-consuming procedures.

In general, the foregoing consist in curing the bird in a brine for a certain period of time depending on the weight of the bird, and then smoking in the smoke house. Some methods call for a continuous smoking process over three to four days, while others recommend an intermittent smoking for six to eight hours for several successive days. Hardwood chips such as apple or hickory wood or corn cobs are usually used in the production of the smoke. Spices may or may not be added—most turkeys offered today are sold on the merits of the special flavoring compound of the curing solution before the smoking takes place.

All smoke house treatments cause loss in the weight of the bird. Due to the heat necessary for smoking, moisture is drawn from the carcass and shrinkage of the tissues occurs with a subsequent loss of weight up to 50%.

There appears to be a difference of opinion as to the length of time the birds should be kept before using after they are smoked. Some recommend using them immediately; others suggest hanging them in a cool, dry place for at least seven days. Birds smoked in the smoke house may be eaten without further cooking, or roasted if preferred.

Reprinted by permission from the New England Poultryman, Boston, Mass.

The use of true smoked salt appears to be the answer to an easy and simple way of imparting a smoky flavor to both chickens and turkeys. The smoked salt used is a high grade of curing salt which has been treated with genuine hickory wood smoke. The salt crystals are coated with the components of genuine hickory smoke by a special process. This smoked salt has been used for a great many years for curing hams and bacon, as a dry cure, by merely rubbing the meat with the smoked salt resulting in the production of a brine. Since chickens and turkeys will not produce sufficient moisture to make their own brine, a dry cure as used for hams and bacon is impractical; therefore, a sweet pickle brine prepared from the genuine smoked salt has been found to be very satisfactory.

The brine is prepared using water that has been sterilized by boiling. When the water is still hot, add two pounds of the smoked salt to each gallon of water; stir well so that all of the salt is dissolved. Do not boil the brine. After becoming cool the brine is strained through a cloth, then cooled further to approximately 40° Fahrenheit. The birds, either chickens or turkeys, are killed and dressed in the usual manner. It is suggested that only fresh-killed birds be used. After dressing they are thoroughly washed both inside and out with cold water, and then chilled.

The brine is then poured onto the birds which have been packed in a stoneware jar. It is necessary that the brine fills the inside cavities of the birds and also entirely covers them. It is advisable to weigh the birds down with a heavy stone or plate so that they will remain covered by the brine throughout the period of cure and to exclude extraneous matter. During this time the birds should be kept at a temperature not exceeding 40° Fahrenheit.

Chickens and small turkeys weighing not more than twelve pounds should be left in the smoked salt brine for one week. Generally birds of broiler size may be left in the brine for four days. Large turkeys should be left in longer, allowing one additional day for each three pounds of weight above twelve pounds.

At the end of the curing period, the birds are removed from the brine, rinsed in clear water and wiped dry. They may be used immediately or they may be wrapped in cellophane or waxed paper and hung in a cool, dry place for use within one or two weeks.

The smoked salt brine method of imparting a smoky tang to poultry meat does not cause shrinkage. If a bird that has dressed out at fifteen pounds is placed in the smoked salt brine, it will weigh not less than fifteen pounds when removed from the cure.

In the cooking of birds that have been treated with sugar cure smoked salt, it is suggested that before cooking they be soaked in cold water for one or two hours, changing the water once. When roasting it is advisable not to baste the birds with their own juices; it is suggested that a fresh material such as hot water and butter be used. A rack should be placed in the bottom of the roasting pan so that the drippings from the birds will not resalt them.

We do not believe the treating of poultry meat with smoked salt adds greatly to the keeping qualities as with hams and bacons, but it imparts a new flavor which tends to increase the consumption of poultry. The method of treatment is so very simple that anyone for just a slight cost can try it in his own home.

All-Purpose Pig Protein

Condensed from Capper's Farmer

Alf G. Crane

MIXED protein feeds have been proved more efficient in hog feeding than any single source supplement. This fact evidently led investigators at Purdue University to seek a "lifetime" compound of all-purpose mixture that would serve through gestation, suckling, developing and finishing periods. Desirability of such a supplement is apparent from the viewpoint of simplicity alone.

The first trial offered some encouragement that such a mixture might be compounded, but the one used failed in two of the phases to demonstrate its superiority over two standard protein sources, tankage and soybean oil meal. However, it did confirm previous trials in which mixed proteins accounted for better gains during the fattening period either on pasture or in dry lot.

Sows fed the mixed supplement, which was composed of 20 parts of meat and bone scraps, 20 parts menhaden fish meal, 30 of soybean oil meal, 10 of linseed oil meal, 10 of cottonseed meal and 10 of alfalfa leaf meal, farrowed an average of 10.33 pigs a litter compared with 11.55 for the tankage and 11.82 for the soy group. Weaned litters averaged 6.58 for the mixed protein group, 7.64 and 8.73 for the others respectively. Birth and weaning weights of individual pigs were higher in the mixed supplement group.

Reprinted by permission from Capper's Farmer, Topeka, Kansas, January, 1939

From average weaning age, 56 days to 76 days old, the pigs continued on rye pasture and their suckling ration. Then 22 from each lot were put on alfalfa and identical rations except for protein supplement. In advancing to 75 pounds the soybean group made cheapest and about as rapid gains as those fed tankage. The mixed protein lot consumed most feed, gained least and the cost was approximately equal those fed tankage.

On alfalfa pasture, free choice corn, mineral mixture and the respective protein supplements, from 75 to about 200 pounds, the mixed supplement pigs made cheapest total gains, most rapid daily gains and consumed the least total feed in making 100 pounds of pork.

Results in this final period confirmed a previous test, in which 53 pound shotes were winter fed to market weights in dry lot. The mixed protein pigs gained 1.72 pounds a day, consumed 377 pounds of feed in making 100 pounds of gain at a feed cost of $3.84. The next highest daily gain was 1.54 pounds made by a lot fed trinity mixture which also consumed the next lowest quantity of feed, 383.5 pounds for 100 pounds gain at the next lowest cost, $3.99.

In the next test, summer of 1938, varying combinations were selected from the 6 ingredients previously mentioned. Fastest and cheapest gains were made by a lot which received a mixture containing 20 parts each of meat-and-bone scraps and fish meal, 40 parts soy oil meal and 10 each of cottonseed meal and alfalfa meal. They gained 1.70 pounds a day, consumed 358.6 pounds of feed, which cost $3.73, in making 100 pounds of gain. Only slightly less efficient was a supplement containing 20 parts each of meat-and-bone and fish meal, 50 parts soy and 10 parts alfalfa leaf meal. Third in daily gain with 1.64 and in feed consumed per 100 pounds gain, with 369.3 pounds, but fourth in cost, $3.89, was the "lifetime" mixture.

The most efficient mixture in this last dry lot trial varied in only one respect from the one which gave best results in feeding on pasture in 1937 and again in 1938. Ten pounds of alfalfa leaf meal replaced ten pounds linseed meal.

Vegetable Varieties of Soybeans

Condensed from The Ohio Farmer

J. B. Park

VEGETABLE or edible soybeans are true soybeans and the plants and seeds look like field soybeans. The big difference is that shelled beans of the vegetable varieties have a flavor and consistency that most people like. This crop has added to our list of vegetables a green shelled bean that can be served fresh from the garden, from a can, or as a frozen product.

Most people like them and many prefer them to green limas. As succotash they are generally rated high.

The chief advantages of vegetable soybeans are these:

1. They make a relatively large yield.

2. They are easy to grow, and require no spraying or dusting.

3. They are not attacked by the Mexican bean bettle nor by any other insects or diseases to an important extent.

4. They withstand dry weather well and do not require a highly fertile soil.

Some disadvantages are:

1. Rabbits are especially fond of them and will sometimes destroy a small isolated patch.

2. Picking the pods is tedious as also is shelling them. After boiling for a few minutes they shell easily.

The beans are ready for use when the pods are well rounded and while pods and seeds are fully green. They lose quality when ripening begins. The beans from a single planting are in condition to use for eight to twenty days, starting about August 20 to 30, depending on the variety used and the season.

Some varieties of vegetable soybeans that are suitable for growing in Ohio are:

Early. Bansei, Fuji.

Midseason. Hokkaido, Jogun, Willomi.

Late. Funk Delicious.

Vegetable soybeans are useful also as mature dry beans. Compared with navy beans vegetable soys have the advantage of being more easily digested, of having more total nutrients per pound, and they do not generate gas in the digestive tract. Soybeans have a good calcium content and are a good source of vitamin B. A limited quantity of canned green soybeans is on the market and they have found ready sale.

Vegetable varieties yield less than field varieties of soybeans. They also have the bad habit of

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shattering their seeds from the pods upon ripening which makes harvesting difficult and uncertain. Furthermore, the seeds of vegetable varieties seem to split more easily in threshing. All these traits make for low yields and poorer quality of seed which means that seed of the vegetable varieties probably must sell for a substantially higher price than field soybeans.

Grass Silage for Layers

Condensed from New Jersey Farm and Garden

William A. Haffert

MR. WALTERS uses fifty-gallon buttermilk barrels to put up his silage. The grass is clipped with an ordinary lawn mower, put in a barrel, and is firmly tamped down as the barrel is filled. To this barrel is added four gallons of molasses mixed with an equal amount of water. The barrel head is then put on top of the molasses- and water-soaked grass, and weighted down, so that there is a pressure of about 200 pounds on the ensilage. Then it is left alone until feeding time.

When the time comes to open the barrel for feeding, there is a mold on top. This is scooped off, and the silage is ready to go to the feeding pans.

"In the dairy silo," explains Mr. Walters, "the size of the silo is such that the silage itself creates enough pressure. But in putting it up in barrels, pressure must be supplied. I do this by putting anything heavy I have handy—usually molasses drums or concrete blocks—on top. They do the trick of keeping the pressure just right."

As to the kind of molasses used, any good feeding molasses will do. Mr. Walters explained that one-half of the 4-4 mixture he uses would be enough to preserve the grass, but he likes the extra molasses in the mixture because it, in itself, is an excellent conditioner for chickens and has considerable feed value.

The answer to the question of what kind of grass is used is "any kind, so long as it is reasonably short, succulent and not too full of weeds. Mr. Walters put up two barrels (one on October 23 and the other on October 28) using cereal grass, cut from a yard sown to wheat in September. Another ten barrels put up during the summer is Kentucky blue grass, with which, incidentally, most of the ranges are sown.

The grass silage is fed when killing frosts make it impossible to feed fresh clippings. Through-

Reprinted by permission from New Jersey Farm and Garden, Sea Isle City, N. J., Dec., 1939

out the growing season, Mr. Walters feeds fresh grass, a practice followed by many poultrymen. The silage simply takes the place of the fresh grass through the winter months and it contains all the vitamins and nutrients of fresh grass. About one quart is fed to each 100 layers and is equal to about four quarts of fresh grass.

And do the chickens like it? I asked this question of Mr. Walters. His reply was, "We'll see." Opening one of the barrels (the one of cereal grass ensiled on October 23), he took out a handful of the cider-like smelling greens and went over to a house in which pullets were housed only a few weeks before. These still flighty pullets of course had never seen or tasted grass silage. At first they eyed the pan of silage with suspicion. Then one, bolder than the others, stepped up and tried some. She never did move from the pan until crowded away by the others who soon formed a ring three feet deep waiting (as pullets do wait!) for a turn at the succulent tidbit.

Once a barrel is opened, the mold scooped off and feeding started, the silage will not spoil if it is fed from the top and fed regularly.

The 4-4 water and molasses mixture can be added to the grass either as the barrel is being filled, or after it is entirely filled. And if there is not enough grass to fill a barrel completely at one cutting, the new grass can be added each day until the barrel is filled. The important thing is to tamp the grass down hard; when this is done a surprisingly large amount will go into a fifty-gallon barrel. The twelve barrels that Mr. Walters now has will keep his flock of 3,200 high- producing White Leghorn layers supplied all winter, "with some left over."

Squash

The Geneva Delicata, a new strain of the old Delicata Squash, said to equal the quality of Table Queen, standard baking squash, has just been named and introduced by the New York State Experiment Station. A limited amount of seed will be available this season. Reports from 32 growers indicate that most of them regard the variety as vigorous, resistant to mosaic, and tolerant to borer injury.

—*Successful Farming*

Blueberries in the Garden

Condensed from New Jersey Agriculture

C. S. Beckwith

Chief in Cranberry and Blueberry Research

THE cultivated blueberry is being grown commercially in southern New Jersey and in many other states north of South Carolina. Many people want to grow them in gardens. The hazards of profitable commercial production need not worry the gardener.

For satisfactory results, special care should be used to make a soil suitable for the blueberry. The trouble encountered probably is great enough to bar many from growing this fruit, but a gardener with a few good specimens in his yard can justly be proud. The bushes are attractive the year around. The fresh berries are especially delicious and the crop on a well tended bush is surprisingly large.

Blueberry soil should be acid, aerated, well drained and supplied with an abundance of partly decayed organic matter. Many soils are sufficiently aerated and well drained but usually additional organic matter would be beneficial. Natural acid peat as found in many bogs and swamps is the best corrective material to use if it can be obtained. Partially decayed leaves, especially oak leaves that decay slowly, give excellent results. Weathered saw dust or spent tan bark may also be used. The organic matter used should be generously applied and well mixed with the soil before the blueberries are planted.

When a large application of these organic materials is made to an ordinary soil, it becomes acid enough for good growth of blueberries. However, if the original soil is very alkaline, it can be made acid effectively, economically, and safely by the addition of from a quarter to a half pound of aluminum sulfate to the square yard. Of course the organic material should be added even to an acid soil.

Clay soils are especially difficult to prepare and should be avoided. In a clay section, the top 18 inches might be removed entirely and six inches of cinders or gravel put in the bottom and top 12 inches refilled with equal parts of sandy loam, sand, and some of the organic materials mentioned.

Blueberry soils should be constantly moist but never saturated. The roots are close to the surface and any variation in the

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moisture affects them quickly. Satisfactory conditions can be obtained by use of a mulch such as is commonly used under rhododendrons.

The mulch may be composed of leaves, straw, dry lawn clippings, or similar loose material at least six inches thick. It should extend at least two feet from the plant and when the plant is full grown, it should cover all the space under the branches. This not only conserves moisture but it also controls weeds. This should be put on when the plants are set out and left the year round. If for any reason the mulch packs it should be shaken up. As the mulch decays it furnishes a new supply of humus for the soil. Clean cultivation is practiced in commercial fields on blueberry soil but a mulch gives more satisfactory results in a garden, especially in a dry location. It eliminates the need for cultivation which would break off many of the feeding roots near the surface of the ground.

The blueberry responds to fertilizer treatments. Probably the safest material would be cottonseed meal used at the rate of a half pound to the plant. This material can be purchased at feed stores, generally. The best time for applying it is just after the plants bloom in spring, and it should be distributed evenly over a three foot square about the plant. A 5-10-5 fertilizer mixture is usually satisfactory applied at the rate of ½ pound to the plant but the treatment should be divided and half put on at blooming time and half a month later. Stable manure is not considered satisfactory for blueberries.

Pruning is largely a matter of judgment in keeping the number of berries small enough so that all can grow into large fruits. The first year, all fruit buds are removed to get the best bush growth possible. The second year, it usually is safe to leave half the fruit buds. As the plants grow older, it is advisable to remove the twiggy growth and the large stems over six years old. The best yields are obtained on stems four years old and every effort should be made to stimulate the growth of new canes.

Any gardener who is experienced in growing rhododendrons or laurel will enjoy growing blueberries. The general culture is much the same except that some pruning and fertilizer is needed with the blueberries for best results. The blossoms of the blueberries are not so large or as colorful as those of rhododendrons but they have a beauty of their own. The foliage is dark green during the growing season and red for a long period in the autumn. The fruit is the chief interest both as it hangs in large clusters on the bush and as it is served with cream on the table.

Grain Smuts

Condensed from American Agriculturist

Willard Crosier

Experiment Station, Geneva, N. Y.

GAMBLING with the smuts of oats and barley is a losing game. The odds are at least two to one against you. Sometimes the loss is not large with one or two percent, or perhaps only a trace of smut affecting the crop. Often, however, 5, 10 or even 15 per cent of the oat grains are diseased and the grain bin lacks just that much of being as full as it should be.

Just to check on the actual condition of oats throughout western New York, several hundred fields in eight counties were examined a few days before harvest. Only 42 percent of the fields were entirely smut-free, and probably most of these were grown from treated seed. Another 19 per cent contained less than 1 diseased plant in each 1000 counted. Then another group comprising 20 per cent of the total were more severely injured, 20 to 30 smutted heads being found in each 1000. The other 19 per cent of the fields belonged to the severely smutted group. Every fifth panicle of oats was ruined in one field and one diseased plant to every nine healthy ones were common.

Laboratory tests have demonstrated that scores are present on many lots of seed irrespective of their appearance. Treatment for disease is a profitable supplement to cleaning, and often the two operations may be combined. Several of the large seed companies now treat all of their oats with formaldehyde and after the spores have been killed the seed is run through a fanning mill both to clean it and to remove the formaldehyde vapors. Field trials for several years have proven that oats treated in this manner are smut-free. Laboratory tests have shown that the seed germinates normally, even three months after treating.

The percentage of smut-infected seedstocks sold by dealers has decreased markedly since the advent of the aeration-formaldehyde process.

On the farm uncleaned oats may be sprayed with formaldehyde at the rate of 1 pint mixed with 1 pint of water to 50 bushels of grain. The seed should be tightly covered for a period of four to six hours and then cleaned and aerated by a fanning mill. The aerated seed may be safely stored until planted. The excess

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may be fed to livestock or, if the oats are valuable, stored for planting the next spring. The commonly recommended method is to treat the cleaned seed only four to six hours before planting. If drilling is delayed for several days, however, the oats should be aerated to prevent reduction in germination.

Another successful modified method depends on a reduced dosage of formaldehyde. When a farmer wants to treat his oats before the spring rush or at least two weeks before planting he should use only ⅓ pint of formaldehyde to each 50 bushels of grain. The seed is well mixed with the chemical and left tightly covered for a day or at least overnight. The oats can then be sacked up ready for planting.

Barley and oats and barley mixtures should be treated with a dust, New Ceresan, rather than with formaldehyde. Certain organisms which attack the young seedlings are controlled only by New Ceresan. Alpha barley can profitably be treated even when smut is not present. The seed to be treated must first be well cleaned, then usually a bushel of barley is sprinkled with a ½ ounce of dust. Additional seed is added and more chemical applied. The process is repeated until a large cone-shaped pile is formed. Then the grain must be shovelled over several times until all visible traces of the dust have disappeared. The treated seed may be placed in coarse sacks and must be held at least 24 hours before planting.

The dosage of ½ ounce per bushel should never be increased. Additional chemical is not necessary for disease control, and may result in reduced germination of the grain. One sample collected was so severly injured that only 11 per cent of normal sprouts developed. The seed had been treated at a 2-ounce rate. Every one of 26 other New Ceresan-treated samples germinated normally after 5 to 9 weeks storage. There is less danger of seed injury and the smuts are controlled just as well if seed which is to be stored for a week or longer is treated with only ¼ ounce of New Ceresan per bushel. Repeated trials have shown that oats and barley treated at this rate are not injured even when stored in tight containers for one year. The gravity treater does a much better job with the New Ceresan than can be done with a shovel and there is less danger of inhaling the poisonous vapors. County agricultural agents have plans for the construction of a very inexpensive treater.

If a grower knows approximately the amount of seed needed for planting, only this quantity should be treated. Any excess cannot be fed because the chemical New Ceresan is poisonous and cannot be removed from

oats and barley. The seed need not be discarded, however, because a germination test the next season will show if it is suitable for planting after prolonged storage. The degree of injury depends largely upon the method of storage. In tight sacks or bins there is little chance for escape of the gases and these in time will injure the seed. Ordinary coarse burlap bags are ideal for keeping treated seed for a long period.

The rate of chemical has a much greater effect upon seed injury than the type of storage does. This is the principal reason for recommending only ¼ ounce of New Ceresan to each bushel of oats or barley. The grower is protecting himself against smut and also avoiding a treatment that will injure his seed. If he is delayed a week or even a month in planting no harm will be done.

Chickens

Experiments extending over a period of 5 years at Iowa State College show that oats are the best single grain for young growing chicks and turkeys, and are excellent for laying hens. Up to 40 percent or more of the ration of the growing chick, the laying hen, and the turkey may well be made up of oats when the quality is good and the price justifies it. Whole oats tended to reduce cannibalism and feather-picking in growing and laying flocks. A high oat ration produced chicks with light or no yellow pigment in the beaks and shanks. For fattening rations they are less efficient than corn.

—*Successful Farming*

The developing chick embryo makes use of the carbohydrates, proteins, and fats in the order mentioned. Up to the fifth day of incubation the young embryo uses up the easily assimilated carbohydrates (glucose). After some of the digestive organs appear, the more complex proteins and fats are broken down and used as a source of energy and growth.

—*American Poultry Journal*

Dry-cleaning eggs by means of a sand-blast is a method practiced on the Pacific Coast for cleaning dirty eggs. The operation gives the eggs a beautiful dull finish.

—*American Poultry Journal*

A Visit with 32,000 Farmers about Fertilizer

Condensed from American Agriculturist

Ben James

A POLL recently conducted by The National Fertilizer Association is an example of this type of modern survey. Over 650 men drove up and down the highways and byways of 35 States asking farmers a set of 25 questions. They were good, down-to-earth questions—"What crops did you put in?" What yields did you get?" "Did you fertilize?" "Did the money you spent for fertilizer pay you?" "Did you get ideas from your farm papers, your experiment station, your county agent, your fertilizer dealer?'

The answers to these questions given by over 32,000 farmers were recorded in 650 books. The books were put in the hands of a tabulating concern which, by use of complex machines that work with impersonal mathematical accuracy, ground out the results. These results have just been recorded. The reading of them is like a meeting with 32,000 neighbors who are up against about the same farming problems you are, and hearing what they have to say about their work.

Of course, when 32,000 farmers speak as one average composite farmer, that one talks in tall figures. Consider the average farmer made up of 32,000 others being asked the question: "From your general experience, what yields do you expect to get from the use of fertilizer, and what yields would you get without fertilizer?" In reply to these questions the composite farmer replied: "I spent $196,947,670 on fertilizer. The value of extra yields produced by it amounted to $709,810,175, and I received an increased income above the cost of fertilizer of $512,862,505." In other words, for each dollar that each farmer spent on fertilizer the average increased return for all States, for all crops, was $3.60.

So far as the greatest return for dollar in crops is concerned, the survey as a whole shows that tobacco pays the highest return. Cotton, fruits, and vegetables also make relatively large returns. The lowest were those shown by grains, but in every case the value of increased yield is more than sufficient to make the use of fertilizer profitable. And when you fertilize a grain crop you usually expect a part of the return on the hay crop that follows.

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The Sixteen-Foot Board

Reprinted from the Towpath

WHEN men tamed draft animals, shelter for them was needed. A good barn would help a family to build a good house. The good barn has to come first with farmers. Sometimes the good house can never be built.

The usual width of a stall for two oxen came to be eight feet. A "long yoke" of four oxen needed a stall sixteen feet wide. For building barns, boards sixteen feet long were convenient, and sixteen feet became and remains a standard length for boards. Sawing boards in two yielded successively boards eight feet, four feet, and two feet long. Using such boards gave spaces in barns such dimensions as eight feet, twenty feet, and twenty-four feet. One does not often find in a barn a space measuring fifteen, seventeen, or nineteen feet on one of its sides.

When the good farm house was built, the same kind of lumber was used. The house and its rooms tended to have measurements like the barn and parts of the barn. A room might be sixteen, eighteen, or twenty feet long. A length of seventeen or nineteen feet would be unusual.

Folkways are persistent and they are usually of rural origin. City houses tend to have measurements like those of farmhouses and so like those of barns. A room sixteen feet long in a city apartment has that length because that would be the width of a stall for four oxen.

Reprinted by permisison from the Towpath, New Hope, Pa.

Mulching Tomatoes with Straw

Condensed from The Rural New-Yorker

LAST season we tried a straw mulch on some of our tomatoes. The soil is a rich Pennsylvania loam with a PH 6. We set out eight rows of Pritchard plants four feet by five feet apart, covering them with baskets to protect from frost. This plan saved the plants from a severe frost a week later.

We cultivated the tomatoes four times and used a 5-8-7 fertilizer at the rate of 800 pounds per acre on June 12. Protection from the flea beetle was secured with Rotenone dust. June 15 we spread 1,600 pounds of wheat straw around the plants covering the entire surface three inches thick, approximately ⅛ acre; four similar areas were left unmulched, but received identical care otherwise. There was very little rain during May, June and July. July 11, the mulched tomatoes showed a more vigorous vine growth and a heavier fruit set.

Picking started on July 11 and was continued every day till September 2. From the start of the harvest the mulched tomatoes were yielding more and better quality fruit than the nonmulched rows and this was true right through the season. The mulched rows, approximately ⅛ acre, produced 5,351 pounds tomatoes or 21.4 tons per acre. The nonmulched rows produced 3,794 pounds or 15.1 tons per acre, an increase in yield on the mulched area amounting to 6.3 tons per acre. If mulch material can be produced on the farm cheaply the grower will benefit greatly by the increased yield of tomatoes at a low cost. Salt marsh hay wherever obtainable could be used instead of wheat straw.

Petroleum — the Farmer's Friend

Condensed from The Southern Planter

THE early history of petroleum in this country is closely associated with the art of healing. The first European settlers in America found the Indians anointing their wounds with petroleum, gathered from natural springs where it seeped out of the ground. Early farmers in New York, Pennsylvania and Ohio likewise regarded "rock oil" as a potent family medicine.

One of the purveyors was Samuel Kier, whose principal business was recovering salt from brine wells. One trouble with the business from Kier's point of view was the fact that petroleum got into the brine and contaminated the salt. Kier, however, was shrewd enough to turn this nuisance into profit. He bottled the petroleum and advertised it as "Kier's Rock Oil" on imitation greenbacks engraved with pictures of derricks used for drilling and pumping the salt wells.

The greenbacks attracted wide attention. One business man who found them interesting lived in New Haven, Connecticut, but owned land at Titusville, Pennsylvania. He knew there was oil in the earth there, and a Yale professor had told him the oil could be used for illumination. But the problem was to get the oil out of the ground. The pictures of the salt well derricks on Kier's greenbacks gave him the answer. The business man and his partner engaged E. L. Drake, a railroad conductor, to develop the Titusville property. Drake hired "Uncle Billy" Smith and his two sons to do the drilling, and in 1859, with crude and makeshift machinery they drilled a hole 69½ feet deep that started a new industry and a new era.

Luckily, something was already known about the refining of crude oil, which had been extracted in small amounts from coal and shale deposits. Five years before Drake's well came in, an American chemist had patented an illuminating oil which he called kerosene. It was considered the finest illuminant in the world—far superior to whale oil, which was fast disappearing, and much better than the turpentine or "camphine" alcohols which had been tried as substitutes.

Refineries for recovering kerosene from oil sprang up in the district opened by Drake's well.

Reprinted by permission from The Southern Planter, Governor St., Richmond, Virginia, February, 1940

Speculators rushed in to drill more wells and new fields were developed nearby. One of the nearest and best-known of these was Pithole City. These were mad, roaring, "boom town" days. Money and oil flowed like water.

One of the things about that period that seems strange to us now is the fact that gasoline was considered a waste product. Nobody wanted it, so refineries dumped it into the river.

Today the oil business presents a vastly different picture. Gasoline is now the most important petroleum product. Instead of three or four little towns producing oil, there are wells in 23 states—330,000 of them. Drake's well yielded 20 barrels a day. We now produce so much that every man, woman and child in the country could be alloted nine barrels a year. The petroleum industry buys $876,000,000 worth of supplies from other industries every year, pays $200,000,000 a year to farmers and other landowners in royalties, bonuses and lease rentals for drilling privileges, and employs over a million persons who share a payroll exceeding $1,500,000,000 a year. And all this has evolved within the memory of some men now alive.

It happened because man has learned how to put petroleum to work doing things he otherwise would have to do himself, taking him places he otherwise could not reach. Farmers particularly have benefited from this development.

It can be said without exaggeration that petroleum and its derivatives have almost completely changed the life of the farmer and his family during the past 25 years. The automobile has brought them within a few minutes of town, and the truck has brought major markets within a few hours of the farm. The tractor has taken much of the drudgery out of the actual preparation and cultivation of the soil.

The introduction of the so-called "baby' tractor in recent years promises to bring these benefits to countless other farmers. These new tractors weigh only a little more than a good draft-type horse, but will do from four to six times as much work—and do it faster. The price brings the tractor within the reach of hundreds of thousands of farmers who do not now own tractors. If the experts are correct in saying that the number of tractors on farms will more than double in the next five years, petroleum products will become of even more importance.

This prediction appears to have validity because tractor efficiency has now reached a point where the horse will be hard pressed to hold his own as an

economical source of power. In fact, on the basis of figures released by the United States Department of Agriculture, the horse already has fallen behind the parade. One of the small model tractors can operate at a cost of 34 cents an hour (the figure will vary with the cost of gasoline) *including* fuel, depreciation, interests, taxes, upkeep and all other costs. The Department of Agriculture says the cost of working one horse is about 15½ cents an hour. Multiply that figure by four—the number of horses a modern tractor replaces—and it is immediately apparent that the horse comes out second best.

The availability of various types of motors and tractors, embodying low-compression or high-compression construction, gives the farmer a wide choice of fuel for his power. The powerful low-compression diesel engines, and many farm tractor models burn low-cost distillates, furnace oils and similar fuels, while other motors are especially built to burn gasoline. The development of these high-compression engines and the utilization of good gasoline made possible the construction of the lightweight, highly efficient, family-size tractor of today. One of these new high-compression tractors develop over one horsepower for every 70 pounds of weight. Compare this with some of the older type machines that required nearly 250 pounds to produce one horsepower. Cost per horsepower, and this is important to the farmer, has come down from more than $50 to less than $25. As better and better gasolines are developed, it is reasonable to expect that the cost per horsepower will decrease still further.

There are other, less spectacular but still important, uses for petroleum products on the farm. Petroleum furnishes light to 85 out of 100 farm homes, operates washing machines for one farm wife out of five, pumps water, furnishes heat, cooks food, chills the refrigerator, saws wood, fills silos. It provides the housewife with paraffin for sealing jars of preserves and jams. It is one of the essential ingredients in insect sprays, disinfectants and liniments for stock. It furnishes lubricants for every piece of farm machinery, including the sewing machine.

Petroleum and its various by-products, therefore, play an extremely important part in the life of the farmer and his family. They have increased their comfort, pleasure and security of existence. There is every reason to believe that the future will see even more extensive use of them.

Leather for the Layman

Condensed from the Cattleman

Under this title, Buxton, Inc., Springfield, Mass., has issued a very interesting pamphlet from which the following are excerpts.

COWHIDE

Of all cattle hides supplied by the beef-raising sections of Western United States, Central and South America—about 85 per cent go into the manufacture of shoes. But cowhide is hard to beat as a sturdy, serviceable leather for luggage, wallets and small leather goods. There are two general types of hides—*packer* hides which are more uniform, more free of brand marks and other imperfections than the *country* hides supplied by the small ranchman and farmer. Cowhide is too thick for small leather goods and must be split by special machines. Most desirable is the full or *Top Grain* Cowhide taken from the hair side of the leather. *Split* Cowhide, the second thickness nearer the flesh, is less tough, more brittle. Recent perfections in tannage have made it difficult to tell Cowhide from Calfskin.

GOATSKIN

Strong lustrous Goat is the most expensive of the major varieties of skins (excluding such specialities as Seal, Ostrich and Alligator.) Goat hides are small and seldom free of imperfections —with the bulk of them shipped from the Orient where leather is often only a by-product. Goat is hard to classify—there being some 68 varieties, few of which can take a natural or fine graining. That's why new finishes for Goatskin are appearing constantly on the market. Chameleon and Mandalay are among the more popular grains. Usually you can judge goat by the size and spacing of its pores which appear in groups of three throughout the skin pattern. As a rule, the finer the pores, the better the quality of the leather.

SHEEPSKIN

This you'll find to be one of the lowest priced leathers, as sheep are raised in almost every country of the world. Sheepskin must be given a hard expensive finish, for the leather is soft and the fibres loosely interwoven . . . considerably less durable than Goat or Cowhide. Used in quantity for men's small leather goods, it is a satisfactory leather provided it is sold as Sheepskin—at a fair price. When embossed as Morocco or Seal, Sheepskin can be identified by the softness of its texture. There are over 60

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varieties of sheep, and you can count as many differences in the qualities of the leather.

OSTRICH

A versatile bird—the Ostrich. As if furnishing plumes weren't enough, it's the only bird whose skin is tanned for commercial use as leather. South Africa is the main source of a limited supply. Perfect skins are rare—tanning and finishing difficult. Quill holes, the marks that identify the leather, cover only a small area of the bird and often only a single wallet can be made from a skin. No two skins are alike in marking or coloring. You can immediately detect inferior Ostrich because it is brittle and has few, if any, quill holes. Selected Ostrich is soft, pliable and one of the most durable of leathers. It doesn't take dye readily, however, and is finished almost always in golden tan, its natural color. In use, it quickly darkens to a rich brown.

ALLIGATOR

Here's a leather that has become more and more popular in the past few years—especially in the manufacture of small leather goods. Alligator is always smart looking—unusually strong despite its thinness. Most of the skin comes from the belly of the reptile—the back is thick and horny—and it goes through a special tanning process of softening, dyeing and glossing. "Alligator farms" supply most of the baby Alligator skin commonly used for small leather goods, although the main sources of Alligators are the swamps and lagoons along the Mexican Gulf, Cuba and the rivers of Central and South America. The skin is judged by the uniformity of its markings—its pliability and sturdiness. The supply is limited—so you have to pay a comparatively high price for Alligator, but it will repay you with years of good wear and service.

SEALSKIN

A dressy leather, this—soft, pliable and usually made up in black. There are two general types—*Pin Seal* and *Silk Grain Seal.* The first has a natural grain developed by manipulation in tanning. As its name implies, *Silk Grain Seal* is a dull, silk-like embossed finish applied to selected Seal Skins. Slightly more expensive, too, because the skins must be perfect—no imperfections can be corrected or glossed over. Because of the increasingly limited supply, Seal is one of the most commonly simulated grains on Calf or Goat Skins. You can detect the difference though by the hardness of the surface, and in *Pin Seal particularly* there is often a faint but pleasant odor of the sea.

INDIA GOAT

Boarded India Goat is the name given to a special selection of Goatskin . . . (it) has a combination of flexibility, durability, softness and long wear that is outstanding.

MOROCCO

Of all fancy Goat leathers, Morocco is probably the most popular. You can recognize it by the peculiarly ribbed grain . . . similar to Seal though actually coarser. The name is derived from the Moors, first to make the leather by bringing the grain out through boarding. The skin is folded, grain surface to grain surface, with pressure applied by a cork board. The general appearance of Morocco appeals most to conservative tastes . . . and because it is made from Goat, it can be guaranteed to give long service.

PIGSKIN

You may have wondered why good Pigskin is comparatively expensive—when the domestic supply of pigs seems more than ample. But only one or two per cent of the pigs slaughtered for meat are ever skinned, and much of this skin has various imperfections. Cutting, for one thing, is extremely difficult because there is no distinction between the skin and the fat of the animal. Best grades of leather come from the skins with straight white hair. A particularly serviceable leather with high natural oil content and compact, cuticle-like fibres—Pigskin actually resists wear.

BUFFALO

You may think so—but the Buffalo commonly used in leather today is not shot out in the great Middle West. That's forbidden by law. Much of it comes from India, especially that which goes into the manufacture of small leatherware. For though a Buffalo hide is noted for its tough, rugged texture—recent perfections in tannage have produced a soft, pliable leather and greatly widened its use in all sorts of merchandise.

CALFSKIN

Made from the skins of animals a few days to a few weeks old, Calfskin is naturally a more soft and supple leather of finer grain than Cowhide. It is split only to insure uniform thickness. Wrinkles in the finished leather, known as "fat wrinkles," are sure signs of a healthy animal and indicates superior quality. Though the United States makes the finest Calf leather today, nearly two-thirds of the supply comes from the big veal-raising countries such as Russia and South America. Calf is both firm and pliable—takes a high polish. Used mainly for shoes, it is popular also as linings and stays for higher priced merchandise.

Egg-Laying Contests

Condensed from Successful Farming

THE 16 standard egg-laying contests now in operation in several states are to the farmer and baby-chick-buying public what the Indianapolis speedway races are to the automobile-buying public. Aside from furnishing contestants and observers an exciting sporting event, they are a valuable testing and proving ground for superior, egg-producing strains of poultry.

Every year, on October 1, about 14,500 hens of the most popular breeds begin a 51-week egg-laying test to decide the highest producers in the country. This year, a Rhode Island Red pullet, Lulu Belle, belonging to J. J. Warren, North Brookfield, Massachusetts, won high individual honors, laying a total of 341 eggs which scored 369.55 points. The winning pen of 13 birds also came from New England, high honors going to Homestead Farm's (Newtown, Conn.) R. I. Reds.

Egg-laying tests are not new. In fact, as far back as 1911 the first egg-laying tests were held at the Connecticut Agricultural College, Storrs, Connecticut; and at Mountain Grove, Missouri. In 1929 representatives of several egg-laying tests met and agreed upon a set of rules, and since that time tests operating under official rules and regulations of the American Record of Performance Council have been designated as "Standard Tests." In general, rules are as follows: The test shall begin October 1 and shall last for 51 weeks; an entry shall consist of 13 birds, the record of all 13 birds counting as the pen total; no replacements shall be allowed except during the first two weeks. In addition, eggs are scored according to egg weight. For example, an 18-ounce egg scores 0.7 point while a 26-ounce egg scores 1.10 points.

Egg-laying contests provide valuable information for commercial-poultry-producers. Contest-managers will send regular monthly reports to interested persons, and with these reports baby-chick-buyers can readily select the best breeders.

Poultry-breeders who are most successful in producing egg-laying test-winners do pedigree-breeding or progeny-testing. This means that they analyze carefully the results they procure from different matings and make future matings accordingly. Only families of birds that have such desirable characteristics as early maturity, high production, short molt, large egg size, and good livability are retained.

For the Farmer's Library

These books are recommended as outstanding in their field:

Beef Cattle—By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Son, Inc. $4.00.
(See Farmers Digest, November, 1939)

Breeding Your Own, or Raising Colts for Pleasure and Profit — By Clarence E. Bosworth. The Derrydale Press ($10.00). A book suitable for the breeders of hunters' and saddle horses.

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. Macmillan Company. $3.60.
(See Farmers Digest, February, 1940)

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, head of the Animal Dept., Cornell Univ. Morrison Press. $5.00.
(See Farmers Digest, October, 1939)

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. Macmillan Co. $2.90.
(See Farmers Digest, January, 1940)

Livestock and Poultry Diseases—By W. A. Billings, Asst. Prof. of Vet. Medicine, Univ. of Minnesota. Macmillan Co. $3.50.
(See Farmers Digest, June, 1940)

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw, Hill & Co. $4.00.
(See Farmers Digest, July, 1939)

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. Macmillan Co. $3.75.
(See Farmers Digest, September, 1939)

Vegetable Crops—By Homer C. Thompson, Ph.D., Prof. Veg. Crops, Cornell Univ. Pub. McGraw Hill Book Co. $5.00.
(See Farmers Digest, May, 1940)

For the convenience of our readers, books listed may be purchased through this Department. Address C. Leavitt Dyer, Farmers Digest, Ambler, Pa.

Soil Conservation Bulletins

To Hold This Soil
Miscellaneous Publication No. 321, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 45c

Terracing for Soil and Water Conservation
Farmers' Bulletin No. 1789, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

What is Soil Erosion?
Miscellaneous Publication No. 286, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 15c

Strip Cropping for Soil Conservation
Farmers' Bulletin No. 1776, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

The Land in Flood Control
Miscellaneous Publication No. 331, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

Conservation Farming Practices and Flood Control
Miscellaneous Publication No. 253, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

Soil-depleting, Soil-conserving and Soil-building Crops
Leaflet No. 165, Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

Soil Conservation Districts for Erosion Control
Miscellaneous Publication No. 293, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

Soil Defense in the Northeast
Farmers' Bulletin No. 1810, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 15c

Erosion on Roads and Adjacent Lands
Leaflet No. 164, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

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